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MEMOIRS AND LETTERS

COLONEL A. S. H. MOUNTAIN, C

LECTURES

ON

SURGICAL PATHOLOGY.

Vol. II.

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ON

SURGICAL PATHOLOGY,

DELIVERED AT THE

ROYAL COLLEGE OF SURGEONS OF ENGLAND,

BY

JAMES PAGET, F.R.S.,

LATELY PROFESSOR OF ANATOMY AND SURGERY TO THE COLLEGE:
ASSISTANT SURGEON AND LECTURER ON PHYSIOLOGY AT ST. BARTHOLOMEW'S HOSPITAL.

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TUMOURS.

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N, BROWN, GREEN, AND LONGMANS.

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1853.

The Lectures in this Volume, and especially those on Cancers, are enlarged far beyond their original extent, by the addition of cases, statistical tables, and various statements which may be worth reading, but of which the recital could not be made agreeable to an audience. In making these additions, I have endeavoured to adduce sufficient evidence for the general conclusions I have drawn, without encumbering the book with such a mass of details as would be repulsive to the majority of readers. I can hardly imagine, that a full relation of so many cases as I have referred to would be acceptable to any besides those who are engaged in the especial study of the subjects of the Lectures. To all who are so occupied, I will very gladly give whatever further information my manuscript records of cases can supply.

It is an unavoidable defect of lectures on general pathology, that they cannot be conveniently used in the study of the diseases of particular organs. I have endeavoured to amend this, in some measure, by a full index, referring, under the title of each organ, to the descriptions of the tumours of which it is most apt to be the seat.

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ERRATA.—VOL. II.

Page 10, l. 5 from bottom *for* cancer, *read* cancers.
19, l. 4, *for* tumour, *read* tumours.
— 5, *for* instances, *read* diseases.
64, note, *see* note to p. 510.
185, l. 8, *for* cancellous, *read* compact.
189, l. 7 from bottom, *for* therefore, *read* thus far.
234, l. 19, *for* largest, *read* large.
306, l. 10, *omit* scirrhous.
315, l. 4, *for* long, *read* large.
320, l. 7 from bottom, *for* condensing, *read* widening.
324, l. 7 from bottom, *for* this alone, *read* chiefly this
376, l. 20, *for* 53, *read* 54.
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those, for instance, in which the excessive growth is adapted to some emergency of disease, as an hypertrophy of the heart is adapted to some emergency of the circulation, we shall, I believe, always see between them this chief difference: that, to whatever extent the adapted hypertrophy may proceed, the overgrown part maintains itself in the normal type of shape and structure; while a tumour is essentially a deviation from the normal type of the body in which it grows, and, in general, the longer it exists the wider is the deviation. A striking illustration of this contrast may be found in some of the cases of fibrous tumours that grow into the cavity of the uterus.* Such a tumour may resemble in its tissues the substance of the uterus itself, having well-formed muscular and fibrous tissues; and, so far as the structures formed in excess are concerned, we might regard the tumour as the result of an hypertrophy not essentially different from that which, at the same time and rate, may take place in the uterine walls around it. But an essential difference is in this; the uterus, in its growth around the tumour, maintains a normal type, though excited to its growth, if we may so speak, by an abnormal stimulus: it exactly imitates, in vascularity and muscular development, the pregnant uterus, and may even acquire the like power; and at length, by contractions, like those of parturition, may expel the tumour, spontaneously separated. But the tumour imitates in its growth no natural shape or construction: the longer it continues the greater is its deformity. Neither may we overlook the contrast in respect of purpose, or adaptation to the general welfare of the body, which is as manifest in the increase of the uterus as it is improbable in that of the tumour.

Herein we seem to discern an essential difference between the overgrowths of tumours, and those accomplished by any exercise of the normal power of nutrition in a part. This power, capable of augmented exercise in any emergency, is yet not a mere capacity of production; neither is it dependent upon circumstances for the fashion of its products; identical with that which effected the development of the germ, it is equally bound to conformity with the proper type of the part or species in which it is exercised.

* Such as (*e. g.*) No. 2682 in the College-Museum. Respecting the conditions in which the changes in the uterus here described are likely to occur, see Rokitansky, Pathologische Anatomie, iii. 546.

An equal contrast may, in general, be drawn between the class of diseases that includes tumours, and all the others that issue in a morbid excess of nutritive formation. We may take, as the example of these, the inflammatory diseases attended with exudation, and say (reserving certain conditions*) that in these there is an excessive exercise of formative force—an hypertrophy. But between such diseases and tumours we shall rarely fail to observe the following differences:—1st. The accumulation and increase of lymph in inflammation appears chiefly due to the morbid state of the parts at or adjacent to the place of exudation. We have, I think, no evidence that the lymph of inflammation increases by any inherent force, any attraction of self-organizing matter, or any multiplication of its own cells; but the increase of all, or nearly all, tumours, is "of themselves:" they grow as parts of the body, but by their own inherent force, and depend on the surrounding parts for little more than the supply of blood, from which they may appropriate materials. A tumour, therefore, as a general rule, increases constantly; an inflammatory exudation generally increases only so long as the disease in the adjacent parts continues.

2d. The materials severally produced in excess, in these two cases, have different capacities of development. The inflammatory exudation, in whatever part it lies, has scarcely more than the single capacity to form, in the first instance, fibro-cellular or fibrous tissue: the material that begins or is added to a tumour may, indeed, assume either of these forms, but it may assume any one of several other forms.

But, 3dly, the most striking contrast is in the events subsequent to this first organizing of the two materials.

* See vol. i. p. 431.

The later course of organized inflammatory exudations, like that of the organized material for repair after injuries, is usually one of constant approximation to a healthy state. As newly-formed parts, they gradually assimilate themselves to the shape and purpose, if not to the tissue, of the parts among which they lie; or they are apt to waste, degenerate, and be removed. Their changes tend ever towards a better state; so that, in the whole course of exudative inflammatory diseases, some can see nothing but an "effort of nature" to avert or repair some greater evil.* It is very different with the class of diseases to which tumours belong: it is in their very nature to proceed to further and further deviation from the proper type of the body. The structure of tumours may, indeed, be like that of some of the natural parts; it may be identical with that of the part in which they lie: in this respect they may be called homologous; but, considered in their life, they are not so; for, commonly, they are growing while the tissues far and near around them are only maintaining their integrity, or are even degenerating, or yielding themselves to the anormal growth.

I think that it is only in the consideration of this activity and partial independence of the life of tumours, and of the diseases allied to them, that we shall ever discern their true nature. We too much limit the grounds of pathology, when, examining a tumour after removal, we only now compare it with the natural tissues. The knowledge of all its present properties may leave us ignorant of the property which it alone, of all the components of the body,

* There are, indeed, cases in which organized lymph and scars continue to grow; but these are quite exceptional, and are to be regarded as diseases of the same class as tumours, peculiar only in respect of the materials in which they are manifested.

had some time ago,—the property of growing. And so, if we can ever attain the knowledge of the origin of a tumour, it may avail little, unless it supply also the explanation of its progress. If, for example, what is very improbable could be proved, namely, that tumours have their origin in the organization of extravasated blood, or of an inflammatory exudation, still this greater problem would remain unsolved:—How or why is it, that, in ordinary cases, these materials, when organized, gradually decrease, and assimilate themselves to the adjacent parts; while, in the assumed formation of tumours, they gradually increase, and pursue, in many cases, a peculiar method of development and growth? Why is it that, assuming even a similarity of origin, the new-formed part manifests, in the one class of cases, a continuous tendency towards conformity with the type of the body; in the other, a continuous deviation from it in shape and volume, if not in texture? How is it that, to take an extreme case, we can ever find, as in a specimen* at St. George's Hospital, fatty tumours of considerable size in the mesentery of a patient from whom, in the extremest emaciation of phthisis, nearly all the natural fat was removed; or, as in a case related by Schuh,† huge lumps of fat, on the head, throat, and chest of a man whose abdomen and legs were extremely thin.

I do not pretend to answer these questions; but I think that in them is the touchstone by which we may tell the value of a pathology of this great class of diseases. It is not in the likeness or in the unlikeness to the natural tissues that we can express the true nature of tumours: it is not enough to consider their anatomy; their physiology, also, must be studied: as dead masses, or as growths achieved, they may

* Y 71, Museum of St. George's Hospital.

† Die Erkenntniss der Pseudoplasmen, p. 101. Wien, 1851.

be called like or unlike the rest of a part; but, as things growing, they are all unlike it. It is, therefore, not enough to think of them as hypertrophies or overgrowths: they must be considered as parts overgrowing, and as overgrowing with appearance of inherent power, irrespective of the growing or maintenance of the rest of the body, discordant from its normal type, and with no seeming purpose.

To all this, I know, it may be objected that tumours, and other like growths, may cease to grow, or grow unequally, and yet are tumours still. But this is only in appearance opposed to what I have said, which is no more than that the best or only time, in which we may discern the true difference of these from other growths, is the time of their active increase. As we can have no complete idea of any living thing, unless it include the recognition of its origin, and of its passage through certain phases of development and growth; so must our thoughts of these abnormities be imperfect or untrue, unless we have regard to their development, and growth, and maintenance, as independent parts. But, indeed, the cessation of growth in tumours and the allied diseases often affords evidences of their peculiar nature, confirmatory of that deduced from their increase. Such cessation may occur when they have attained a certain regular size; as in the painful subcutaneous tumours, the osseous tumours on the phalanges of great toes, and some others, which, perhaps always, cease to grow when they have reached a limit of dimensions that appears as natural and constant for them as the average stature is for the individuals of any species. Or, the cessation of growth may occur when the tumour degenerates or wastes; as when a fibrous tumour calcifies, or when a mammary glandular tumour is absorbed. But it is to be observed that these events are, or may be, as irrespective of the nutrition of all the rest of the body, as the development and growth of the tumour were;

and that, except in the comparatively rare event of the absorption of a tumour, there is, in no case, an indication of return to the normal type or condition of the body: there is no improvement, as in the organized lymph exuded in the inflammatory process, no adaptation to purpose, no assumption of a more natural shape. In all these events, therefore, as well as in their growth, the nearly independent nature of the tumour is shown: while forming part of the body, and borrowing from it the apparatus and the materials necessary to its life, the tumour grows or maintains itself, or degenerates, according to peculiar laws.

The characters of which I have been speaking belong to a larger number of abnormities than are usually called tumours: they belong, indeed, to a large class, of which tumours form one part or section, while the other is composed of certain morbid enlargements of organs, by what is regarded as merely hypertrophy; such as that of the prostate, the thyroid gland, and others.* Now the dis-

* The class may seem to include, also, those abnormal states of the fœtus which are attended with excessive growth or development of organs or members, yet cannot be ascribed to a fusion of two germs; and, indeed, in the case of certain bony growths the line cannot be drawn, without artifice, between monstrosities by excess and tumours (see Lecture VII.) But, in the large majority of cases, there are sufficient characters of distinction between them; for, 1st, the congenital excesses of development present a more complex structure, and are more conformed to the plan and construction of the body, than anything that can be reasonably called a tumour. And, if it be said that this higher organization is no more than is consistent with the period of formation, which is in embryo-life, when the force of development is greatest, then, 2dly, we may note this difference; that the congenital excesses are usually limited for their increase to the period of natural growth of the body. They commonly cease to grow when or before the body has attained its full stature: they conform to its methods and times of development, growth, and decay.

tinction between these two divisions of the class must, I believe, be an arbitrary one; for the two are so little unlike, that, really, it is in these hypertrophies of glands that we may hope to find the truest guidance to an insight into the nature of tumours.

In speaking of cysts from the walls of which vascular growths may spring and fill their cavities, I shall have to describe that these intra-cystic growths are, in their best state of structure, close imitations of the gland in which they occur. In relation to tumours, the most instructive examples of this fact are in the cystic tumours of the breast, of which the general structure has been especially illustrated by Dr. Hodgkin and Sir B. C. Brodie, and the microscopic characters by M. Lebert and Mr. Birkett. Among these, a series of specimens in the Museum,* may illustrate every stage of the transition, from the simple cyst, to the cyst so filled with gland substance as to form a solid tumour,—the chronic mammary, or mammary glandular tumour. Now a near parallel with the history of these mammary tumours is presented by the observations of Frerichs† and Rokitansky‡ on the intra-cystic growths which occur within the substance of enlarging thyroid glands, *i. e.* of increasing bronchoceles. In these, masses of new-formed thyroid gland-tissue are found imbedded, and inclosed in fibro-cellular coverings or capsules, within the proper though increased substance of the gland. In like manner, as Rokitansky has shown, it is not unusual, in enlargements of the prostate gland, to find distinct masses of new structure imitating that of the prostate,

* Mus. Coll. Surg., Nos. 168, 169, 170, 172, &c.

† Ueber Gallert- oder Colloidgeschwülste. Göttingen, 1847.

‡ Zur Anatomie des Kropfes; and Ueber die Cyste, in the Denkschr. der k. Akademie der Wissenschaften, Wien, 1849.

which lie imbedded and incapsuled in the proper substance of the gland. Moreover (and here is a closer contact between these hypertrophies and tumours), these growths of new gland-tissue may appear, not only in the substance of the enlarging thyroid and prostate glands, but external to and detached from the glands. Such out-lying masses of thyroid gland are not rare near bronchoceles; lying by them like the little spleens one often sees near the larger mass. Near the enlarged prostate, similar detached out-lying masses of new substance, like tumours in their shape and relations, and like prostate gland in tissue, may be sometimes found. A very large and remarkable specimen of the kind was sent to me by Mr. Wyman.* It was taken from a man, 64 years old, who, for the last four years of his life, was unable to pass his urine without the help of the catheter. He died with bronchitis; and a tumour, measuring 2½ inches by 1½, was found, as Mr. Wyman described it, "lying loose in the bladder, only connected to it by a pedicle, moving on this like a hinge, and, when pressed forwards, obstructing the orifice of the urethra." Now, both in general aspect and in microscopic structure, this tumour is so like a portion of enlarged prostate gland, that I know no character by which to distinguish them.†

The relation of these new-formed isolated portions of thyroid or prostate gland is so intimate, on the one side, to admitted tumours, such as the chronic mammary, and, on the other side, to the general hypertrophies of the glands, that we cannot dissociate these diseases without great vio-

* The specimen is in the Museum of St. Bartholomew's Hospital. A remarkable tumour of the same kind, but imbedded in the substance of the prostate, is in the Museum of the Middlesex Hospital.

† Such tumours will be further described in the eighth lecture.

lence to nature. Clearly these are all essentially the same kind of disease: yet, to call them all "tumours" would be to do as much violence to the conventional use of terms which have become not merely the expressions, but the guides, of our thoughts. The best course seems to be to make an arbitrary division of this group. In accordance, then, with the arbitration of custom, we may assign the name of tumours to such examples of these morbid growths or growing parts, as, 1st, are isolated from the surrounding parts by distinct investing layers of tissue; or, 2dly, though continuous with the natural parts, are abruptly circumscribed in the greater part of their extent; or, 3dly, are formed of new materials infiltrated and growing in the interstices of natural parts.

If the group of what are to be called tumours may be thus inclosed, we may next proceed to divide it into smaller parts. And, first, it seems proper to divide tumours according as they may be named innocent or malignant. I would employ these terms still, because, though not free from objections, they imply a more natural and a less untrue division than any yet invented to replace them. The distinction between innocent and malignant tumours is probably one, not of mere visible structure, but of origin and vital properties; it is, therefore, less falsely expressed by terms implying quality of nature, than by such as refer to structure alone.

The chief distinctions are to be traced in certain characters which, in the malignant tumours or cancer (for these terms are synonymous) are superadded to those already cited as belonging to the whole class.

And, first, the intimate structure of malignant tumours is, usually, not like that of any of the fully developed natural parts of the body, nor like that which is formed in a natural process of repair or degeneration.

Many of the cells of cancers, for example, may be somewhat like gland-cells, or like epithelium-cells; yet a practised eye can distinguish them, even singly. And much more plainly their grouping distinguishes them: they are heaped together disorderly, and seldom have any lobular or laminar arrangement, such as exists in the natural glands and epithelia, or in the innocent glandular or epithelial or epidermal tumours. These innocent tumours are really imitations, so far as their structure is concerned, of the natural parts; and the existence of such imitations in any tumours makes the diversity — the heterology, as it is called — of the malignant tumours, appear more evident.

Still, this rule of dissimilarity of structure in malignant tumours is only general. The other properties of malignancy may be sometimes observed in tumours that have, apparently, the same structure as those that are generally innocent. I shall have to refer to cases of fibrous tumours which, in every respect of structure, were like common fibrous tumours, and yet returned after removal, and ulcerated, with infection of adjacent parts, and appeared in internal organs. These, with some others, must be regarded as malignant, though in structure resembling innocent tumours and natural tissues. On the other hand, there are some innocent cartilaginous tumours, with structures as different from those that exist in our natural tissues, as cancer-cells are from gland-cells or from epithelial-cells. The two sets of cases, though both be exceptional, supply sufficient grounds for not preferring such terms as "homologous" and "heterologous" before "innocent" and "malignant," if the former are meant, as they commonly are, to apply to the structure of the several growths.

Secondly, malignant growths may have the character of infiltrations; *i. e.* their elementary structures may be inserted, infiltrated, or diffused in the interspaces and cavities of the tissues in which they lie. Thus, in its early state, a malignant tumour may comprise, with its own proper elements, those of the organ in which it is formed; and it is only in its later life that the elements of the tissue or organ disappear from it, gradually degenerating and being absorbed, or, possibly, yielding themselves as materials for its growth.*

Thus, a hard cancer of the mammary gland includes in its mass a part, or even the whole, of the gland itself, as if there were only a conversion of the gland-tissue: and one may find, within the very substance of the cancer, the remains of the lactiferous tubes involved in it, and, with the microscope, may trace in it the fibro-cellular tissue that separated the gland-lobes, and the degenerate elements of the epithelial contents of the tubes and acini. But among all these lie the proper cells of the cancerous growth, and these usually increase while the original structures of the gland decrease. So, too, in medullary cancerous disease of the uterus, the uterus itself, or part of it, is in the tumour, and gradually wastes, while the medullary matter, diffused or infiltrated in it, is growing.

The malignant growths may, I say, thus appear as infiltrations; but they are not always so. Thus, though the hard cancer of the breast is, commonly or always, an in-

* See, on this last-mentioned point, Rokitansky, Pathol. Anatomie, i. 121. If, in such a case, the removal of the original textures be quicker or more considerable than the production of the new morbid substance, there may be no swelling or visible tumour; yet, since the new material increases, the essential character of a growth is observed. Such growth without swelling is often noticed in hard cancers of the breast and of the bones.

filtration of cancerous substance in and among the proper structures of the gland, yet the hard cancer of the bones is often a distinct tumour, such as has no mixture of bone in it, but may be enucleated from the cavity or shell of bone in which it lies. So, too, while the medullary cancer of the uterus plainly consists in an infiltration or insertion of new material in the substance of the organ, that of the breast is usually a separate tumour, and altogether discontinuous from the surrounding parts.*

Many other instances of similar contrast might be cited; still the fact that their elementary structures may be thus infiltrated in the tissues they affect is a characteristic feature of malignant tumours. I think it is rarely imitated in cases of innocent tumours.

3rd. It is, also, generally characteristic of malignant tumours that they have a peculiar tendency to ulcerate, their ulceration being commonly preceded by softening. One can, indeed, in this particular, only observe a graduated difference between the innocent and the malignant diseases; (for certain innocent tumours, if they grow very rapidly, are apt very rapidly to decay; and they may suppurate and discharge their ichor and débris with foul and dangerous ulceration.) Thus the quickly-growing cartilaginous tumours may imitate, in these respects, malignant growths; so may large fibrous tumours when they soften and decay. Or, again, when an innocent tumour grows more rapidly than the parts over it can yield, they may waste and ulcerate, and allow it to protrude; and it may now itself ulcerate and look very like malignant disease. This may be seen in the

* Nos. 2787, 2796, and others in the College-Museum; and Nos. 15 in Ser. 32, and 28 in Ser. 35, of that of St. Bartholomew's, illustrate these contrasts. On the difference between *infiltrations and outgrowths*, see p. 22.

protruding fibrous tumours that ulcerate and bleed; or, in a more striking manner, in the protruding vascular growths that have sprung-up in the cystic tumours of the breast. Or, once more, the characters of readiness to ulcerate may be imitated by innocent tumours after injuries, or in exposure to continued irritation; for they resist these things with less force than the similar natural parts do. Hence, sloughing and ulcerating fibrous, erectile, and other tumours, have been often thought cancerous, and so described.

The respective tendencies to ulcerate can, therefore, be counted only as constituting differences of degree between the innocent and the malignant tumours. We may speak of a liability in the one case, of a proneness in the other.

4th. The softening that often precedes the ulceration of malignant growths can hardly be considered separately from the minute account of their structure. I therefore pass it by, and proceed to their fourth distinctive character, which is to be noticed in the modes of their ulceration.

This is, that the ulcer which forms in, or succeeds, a malignant growth, has no apparent disposition to heal; but a morbid substance, like that of which the original growth was composed, forms the walls or boundaries of the ulcer; and as this substance passes through the same process of ulceration which the primary growth passed through, so the malignant ulcer spreads and makes its way through tissues of all kinds.

In contrast with this character of malignant growths, it is observable that beneath and around an ordinary ulcer of the natural tissues, or of an innocent tumour, we find the proper tissues unchanged; or, perhaps, infiltrated and succulent with recent lymph, or the materials for repair; or somewhat indurated with lymph already organised. The base and margins of a cancerous ulcer are themselves also cancerous; those of a common ulcer are infiltrated with only reparative or inflammatory material. In like manner, if ulceration extend through an innocent growth, it may destroy it all, and no similar growth will form in the adjacent parts, replacing that which has been destroyed: but, in the ulceration of cancer, while the cancerous matter is being constantly discharged, by sloughing or ulceration, from the surface, new matter of the same kind, and in more abundance, is being formed at some distance from the surface; so that, in a section through an ulcerated cancer, one does not arrive at healthy tissues till after passing through a stratum of cancer.

5th. Malignant tumours are, again, characterised by this; that they not only enlarge, but apparently multiply or propagate themselves; so that, after one has existed for some time, or has been extirpated, others like it grow, either in widening circles round its seat, or in parts more remote.

Mere multiplicity is not a distinctive character of malignant diseases; for many innocent tumours may be found in the same person. But in the conditions and circumstances of the multiplicity there are characteristic differences. Thus, when many innocent tumours exist in the same person, they are commonly, or always, all in one tissue. A man may have a hundred fatty tumours, but they shall all be in his subcutaneous fat: many fibrous tumours may exist in the same uterus, but it is so rare, that we may call it chance, if one be found in any other part in the same patient: so, many cartilaginous tumours may be in the bones of the hands and feet, but to these, or to these and the adjacent bones, they are limited.

There is no such limitation in the cases of multiplicity of malignant tumours. They tend especially to affect the lymphatics connected with the part in which they first arise; but they are not limited to these. The breast, the lymphatics, the skin and muscles, the liver, the lungs, may be all, and at once, the seats of tumours. Indeed (and here is the chief contrast), it is more common to find the many malignant tumours scattered through several organs or tissues than to find them limited to one.

Moreover, if there be a multiplicity of innocent tumours, they have generally a contemporary origin, and all seem to make (at least for a time) a commensurate progress. But the more ordinary course of malignant tumours is, that one first appears, and then, after a clear interval of progress in it, others appear; and these are followed by others, which, with an accelerating succession, spring-up in distant parts.

6th. A sixth distinctive character of malignant tumours is that, in their multiplication, as well as in their progress of ulceration, there is scarcely a tissue or an organ which they may not invade.

In regard to their multiplicity, I have just illustrated their contrast in this point with the innocent tumours; and a similar contrast is as obvious in the characters of the ulcers. It is seldom that a common ulcer extends, without sloughing, from the tissues it has first affected into any other; rather, as a new tissue is approached, it is thickened and indurated, as if to resist the progress of the ulcer. But before a cancerous ulcer the tissues in succession all give way, becoming first infiltrated, and then, layer after layer, degenerating and ulcerating away with the cancerous matter.

One may see this very well in bones. Specimens are to be found in nearly all Museums, of tibiæ (for example) on the front surfaces of which new bone is formed, in a circumscribed round or oval layer, a line or two in thickness. This bone, which is compact, hard, smooth, and closely united with the shaft beneath it, was formed under an old ulcer of the integuments of the shin. But, on the other side, specimens are found, which show that when a cancerous ulcer reaches bone, at once the bone clears-away before it; and a cavity with abrupt, jagged, eaten-out edges, tells the rapid work of destruction.* Neither are specimens rare, showing the progressive destruction of more various tissues; such as a cancer of the scalp making way by ulceration through the pericranium, skull, and dura mater, and then penetrating deeply into the brain;† or one in the integuments of the shin going right through the tibia, and deep into the muscles of the calf.‡

Such are the general characters of malignant tumours. Those of innocent ones are their opposites or negatives. Thus: innocent tumours have not a structure widely different from that of a natural tissue; they do not appear as infiltrations displacing or overwhelming the original tissues of their seat; they do not show a natural proneness to ulceration; nor is the ulceration, which may happen in one through injury or disease, prone to extend into the adjacent parts: they do not appear capable of multiplying or propagating themselves in distant parts: they do not grow at the same time in many different tissues.

Now, the distinctive value of each of these characteristics of malignant disease may be depreciated: indeed, I have myself lowered it, by showing that each of them may be absent in tumours having all the other features of malignancy, and that certain of them may be observed occasionally in tumours that in other respects appear non-malignant. But objections against each character separated from the rest are of little weight against the total value of all these

* In the College-Museum, Nos. 3082-3-3 A; 3267-8, and many others, illustrate these points.

† Museum of St Bartholomew's, vi. 57.

‡ Museum of the College of Surgeons, 232.

characters of malignancy, or of a majority of them, concurrent in one case. Similar objections might be made against even the classifications of natural history: and none but such as are disposed to cavil at all nosology, could fail, in watching a series of cases of tumours through many years, to observe that the great majority of them could be classed according as, in their course, they did or did not present the characters that I have enumerated. Some cases would be found in which one or two of the signs might be wanting, or, if I may so speak, misplaced; but, putting these aside, as exceptions to be regulated by future inquiry, and looking broadly at the whole subject, no one could doubt that this division of tumours into innocent and malignant may be justly made, and that the outward marks by which they are discriminated are expressions of real differences in their properties and import.

In what these differences may consist I shall not discuss till I have completed my account of each kind of tumour. For the present I will say only, that I think malignant tumours are local manifestations of some specific morbid states of the blood; and that in them are incorporated peculiar morbid materials which accumulate in the blood, and which their growth may tend to increase. All their distinctive characters are, I think, consistent with this view: and the absence of the same characters in innocent tumours may lead us to believe that they are usuallly local diseases, the result of some inexplicable error of nutrition in the part that they affect, and only in the same measure dependent on the state of the blood as are the natural tissues, which require, and may be favoured by, the presence of their appropriate materials of nutrition. Or, when, as sometimes happens, an innocent tumour begins its growth during, or soon after, some general disease, we may suppose that it owes its first formation to an abnormal condition of the blood; but that, when the blood recovers its health, the tumour subsists or grows on the nourishment supplied by the normal materials of the blood. Instances of tumour thus constitutional in their origin, but subsisting as local instances, will be mentioned in the general history of cancers.

It may be best to speculate no further, either on this point, or on the origin or determining causes of tumours. I could speak certainly of very little connected with these points, unless it were of the error or insufficiency of all the hypotheses concerning them that I have proposed to myself, or have read in the works of others. One of these alone seems to need disproof: namely, that tumours, whether innocent or malignant, are due to the organization of effused blood, or of some inflammatory exudation, or of the material of repair. The great objections to this view are as follows: 1. It is an almost infinitely small proportion of injuries that are followed by the growth of tumours. 2. In a large majority of cases of tumour, no injury or previous local disease is assigned, even by the patients, as the cause of the growth. In 200 cases, taken indiscriminately from those I have lately recorded, no local cause whatever could be assigned for the growth of 155 tumours, of which 64 were innocent and 91 malignant; of the remaining 45, referred by the patients to previous injury or disease of the part, 15 were innocent and 30 malignant tumours. 3. Blood extravasated, and the products of the inflammatory and reparative processes, are not indifferent materials, such as would pursue this or that direction of development, according to chance, or some imaginary influence exercised on them. They have a proper tendency to assume the form of fibro-cellular, fibrous, or osseous tissue. They do not become, when their history can be traced, either fatty, or perfectly cartilaginous, or glandular tissue, such as we find in tumours. 4. No intermediate conditions have been yet found between blood or lymph and a tumour. And, lastly, all the facts relating to injuries, as favouring or determining the growth of tumours, are explicable on the supposition that the injury impairs for a time the nutrition of a part, and diminishes its power of excluding abnormal methods of nutrition.

Narrowing, now, the objects of consideration to the innocent tumours alone, I will speak very briefly of their classification.

A first subdivision of them may be made, according to the usual arrangement, into the cysts or cystic tumours, and the solid tumours. There are, indeed, not a few instances in which the two divisions overlap or are confused. Thus, on the one side, in cases to which I have already referred, a solid growth may spring from the inner walls of a cyst, and, enlarging more rapidly than the walls do, may fill the cavity, and come in contact and unite with the walls; and thus may be traced a complete series of gradations from the cystic to the solid tumour. On the other hand, cysts may be formed within solid tumours, and, increasing more rapidly than the solid structure, may reduce it to scarcely more than a congeries of cysts, or to one great cyst. Such changes are illustrated sometimes in fibrous tumours of the uterus; and I think, also, in the tumours which Sir Astley Cooper called "hydatid disease" of the testicle.

But though there are these instances of confusion, yet the division is very convenient, and is probably deeply and well founded.

Next, among cysts, some are filled with a simple fluid, containing no organised matter, and resembling one or other of the fluids of serous cavities. These may be called simple or barren, or, in most instances, serous cysts.

Other cysts contain organised substances, and may be named, as a group, proliferous; and the several members of the group may be described, according to their contents, as glandular, cutaneous, sebaceous, dental, and the like.

Of the solid innocent tumours, no method of arrangement at present appears reasonable but the old one, which is founded on their likeness to the natural tissues. On this ground they may be arranged in the following divisions, with names, as specific names, expressing their several resemblances,—viz., fatty, fibro-cellular, fibrous, fibroid, and fibro-nucleated, cartilaginous, myeloid, osseous, glandular, and vascular or erectile. And, again, under each of these may be arranged certain varieties, including instances that, in some uniform manner, deviate, without quite departing, from the usual characters; as the fibro-cystic, fibro-calcareous, and other varieties of the fibrous tumours.

In each assumed kind or group of these solid tumours, moreover, we must make a division, according to their modes of growth, and of connection with the adjacent parts. Some among them are only intermediately connected with the adjacent parts; a layer of tissue at once separates and combines them, and, by division of this layer, such a tumour may be cleanly and alone removed from the surrounding parts; it may be enucleated or shelled-out from them. Thus, with a common fatty tumour, or a fibrous tumour of the uterus, if we cut along one part of its surface, we may, with a blunt instrument, detach the whole mass, by splitting the layer of fibro-cellular tissue which, like a capsule, incloses and isolates it.

These are what we commonly accept as the proper or typical tumours, these which are "discontinuous hypertrophies."

Other growths resemble these in every character, except in that they are connected with the adjacent parts by continuity of similar tissue, and thus appear as growths, not in, but of, the parts. Thus we cannot exactly isolate a polypus of the nose or of the uterus: the overgrown part cannot be enucleated, because the proper tissue of the nasal mucous membrane, or of the uterine wall, is continued into it; the tissue of the growth is here not only uniform, but continuous, with that of the adjacent parts. So, too, with epulis: the gum itself, or the periosteum of the jaw together with the gum, seems, by its own excessive growth, to form the tumour; and in other fibrous tumours on bones, the fibres of the periosteum appear to be in the growth, and to form part of it.

Such growths as these might be named "continuous hypertrophies," or "outgrowths;" and I will, in general, observe this distinction wherever the same tissue is, in different cases, found in both forms of growth; calling the discontinuous masses, tumours, the continuous ones, outgrowths. Thus, answering to the common fatty tumour, we find the pendulous and continuous fatty outgrowths of the neck or the abdominal walls; answering to the fibro-cellular tumour that grows, as a discontinuous mass, in the scrotum or beneath the labia, we have the cutaneous outgrowths or enlargements of these parts; to the fibrous tumours of the uterus answer the fibrous polypi or continuous outgrowths of its substance. All these instances of clear distinction might lead us to think that a strong definition-line might be drawn to divide the whole class of innocent overgrowths into tumours and outgrowths. But when we come to the tumours of bone and periosteum, and to the erectile tumours, we find the distinctions vanishing, and in many instances no longer possible.

It may seem as if these "outgrowths" needed distinction from the "infiltrations" which were spoken of as peculiar to malignant diseases. The distinctions between them are well marked. In the outgrowth the new material is like that with which it is connected, or like its normal rudiment, so that it is as if the tissue were itself outgrown; but, in the infiltration, the new material is dissimilar from that in the interstices of which it is placed. And in the outgrowth the materials of the original part appear to be at least maintained, if they are not increased; but in the infiltration they degenerate and waste. We may compare, for this contrast, the cancerous diseases of the skin, with the cutaneous outgrowths of the labia, nymphæ, prepuce, or scrotum.

In thus briefly indicating that which appears still the most reasonable method of classifying tumours, I have referred to difficulties which have appeared to some to be insuperable objections to any attempt at an arrangement of these diseases. I will therefore state, so far as I can, what is the real weight of these objections.*

First, it is said, such classifications cannot be well made, because, between each two assumed kinds or groups of tumours, intermediate examples may be found transitional, as it were, from one species to the other: the one, it is said, "runs into" the other; or, as Mr. Abernethy expressed it, "diseases resemble colours in this respect,—that a few of the primary ones only can be discriminated and expressed, whilst the intermediate shades, though distinguishable by close attention and comparative observation, do not admit of description and denomination."†

This is exactly true; but Mr. Abernethy seems to have felt that his sentence supplied the answer to the objection against classification by structure, which it expressed; for

* The best statement of these objections is by Vogel; but he has well answered his own arguments by disregarding them in his nomenclature of tumours.

† An attempt to form a Classification of Tumours according to their Anatomical Structure. Surgical Works, vol. ii. ed. 1815.

as he did not, because of the intermediate tints, refuse to name and arrange the primary colours, so neither did he, nor need we, hesitate to name and classify diseases, and among them the principal forms of tumours.

Moreover, the objection that structures may be found intermediate between those belonging to the chief forms of tumours, may be as well made against the use of names and systems for the natural tissues. There are no strongly outlined characters defining any of the natural tissues that are ever imitated in tumours; intermediate and confusing forms are found everywhere. The various forms of fibro-cartilage, for instance, fill up every possible gradation from cartilage to fibrous tissue: between fibro-cellular and fibrous tissues, between tendons, aponeuroses, and fasciæ, between epithelium and simple membrane, there are, in the natural tissues, the narrowest gradations. Yet we name and arrange the natural tissues with some truth and much utility; and so we may the tumours that resemble them.

Another objection against this classification of tumours is made on the ground that there are some in which two or more different tissues are mingled. Thus, tumours may be often found, in which fat and fibro-cellular tissue, or fibrous tissue and organic muscle, or cartilage and glandular tissue, or other combinations, meet together. But, among these, some are imitations of natural combinations of tissues, as the fibrous and organic muscular tissues of the uterus are imitated by the so-called fibrous tumours in its walls; and of the others, it need only be remembered that such combinations do occur, and these may be put aside from any interference with arrangement, by making a series of mixed tumours, or by adding to the description of each species the combinations into which it may enter.

Yet another objection is made, that the characters of tumours are not constant, and that many must be reckoned as examples of one species, which are not much, if at all, like one another.

This diversity of characters is, indeed, the great difficulty with which the pathology of tumours has to contend; but the diversity is not to be called inconstancy: it is due to the fact that each tumour has, like each natural tissue, its phases of development, of degeneration, and of disease. Now we have scarcely yet begun the study of the variations to which, in each of these phases, the several tumours are liable. We may have learned, for example, the general characters of cartilaginous tumours, as they grow in the most favourable conditions; but how little do we know of the various aspects these may present when they fail of due development, or fall into various diseases, or variously degenerate! Yet all these changes have to be studied in the history of every tumour; and it would be as reasonable to charge any natural tissue with inconstancy, because it is altered in development and disease, as to hold that the similar diversity of tumours is an objection to their classification according to their structure.

However, while I put this aside as an objection against classification, let me not be thought to underrate it as a difficulty; it is the great difficulty with which we have to contend. The work we have to do is not only to distinguish each kind of tumour from all other kinds, but, and in order to this end, to distinguish, as I may say, each kind from itself, by learning in each all the changes occurring in the various stages of its life. The difficulty of such a task cannot be exaggerated, while we consider the rarity of the objects to be studied; but it must be overcome before we can cease to speak of "anomalous tumours," and of "strange distempered masses," or, which is more important, before we can, even after the removal of a tumour, speak with certainty of the issue of a case.

LECTURE II.

SIMPLE OR BARREN CYSTS.

The *Cysts*, or *Cystic Tumours*, to which I shall devote this lecture and the next, form a very numerous group, and have only or barely these characters in common; namely, that each of them is essentially a cyst, sac, or bag, filled with some substance which may be regarded as entirely, or for the most part, its product, whether as a secretion, or as an endogenous growth.

We may conveniently arrange cysts under the titles "simple" or "barren," and "compound" or "proliferous;" the former containing fluid or unorganized matter, the latter containing variously organised bodies.

Among the simple or barren cysts, we find some that contain a fluid like that of one of the serous membranes; such are certain mammary cysts, and those of the choroid plexus: some are full of synovia-like fluid, as the enlarged bursæ: others are full of blood, or of colloid, or some peculiar abnormal, fluid: while others, forming the transition between the barren and the proliferous cysts, contain more highly organic secretions, such as milk, or mucus, or salivary or seminal fluid. These several forms we may arrange with names appropriate to their contents; as serous, synovial, mucous, sanguineous, colloid, salivary, seminal, and others.

Among the cysts, whether barren or proliferous, it is probable that at least three modes of origin may obtain. 1st. Some are formed by the enlargement and fusion of the spaces or areolæ in fibro-cellular, areolar, or other tissues. In these spaces fluids collect and accumulate; the tissue becomes rarified; and, gradually, the boundaries of the spaces are levelled-down and walled-in, till a perfect sac or cyst is formed, the walls of which continue to secrete. Thus are produced the bursæ over the patella, and others; and to this we may refer, at least in some cases, the formation of cysts in tumours, and, perhaps, in other parts.

2dly. Some cysts are formed by dilatation and growth of natural ducts or sacculi; as are those sebaceous or epidermal cysts which, formed by enlarged hair-follicles, have permanent openings. Such, also, are certain cysts containing milk, that are formed of enlarged portions of lactiferous tubes; such the ovarian cysts formed by distended and overgrown Graafian vesicles; and such appear to be certain cysts formed of dilated portions of blood-vessels shut off from the main streams.

3dly. Many, and perhaps the great majority of cysts, such as those of the kidney, the choroid plexuses, the chorion, and the thyroid gland, are formed by the enormous growth of new-formed elementary structures having the characters of cells or nuclei, which pursue a morbid course from their origin, or from a very early period of their development.

It might, on some grounds, be desirable to classify the cysts according to their respective modes of formation; separating the "secondary cysts," as those have been called which are derived by growth or expansion of normal parts, from the "primary," or, as they might be called, the "autogenous" cysts. But, at present, I believe, such a division cannot be made; for of some cysts it is impossible to say in which method they originate, and, in some instances, either method may lead to an apparently similar result. Thus, some sebaceous or epidermal cysts are clearly formed of overgrown hair-follicles; others are of distinct autogenous origin. Some ranulæ are probably formed by dilatation of the submaxillary duct, obstructed by calculi or otherwise; others by anormal development of distinct cysts, or possibly of a bursa between the muscles of the tongue.* Some cysts in the mammary gland are certainly dilated portions of ducts; others are, from their origin, anormal transformations of the elementary structures of the gland. But in each of these cases it may be impossible, when the cyst is fully formed, to decide what was its mode of origin: whether by growth of parts once normally formed, or by transformation of elementary and rudimental structures.

Of the three modes of the formation of cysts to which I have referred, the first two, namely, that which is accomplished by expansion of areolar spaces, and that by dilatation and growth of ducts or vesicles, scarcely need an explanation.

Indeed, if it were not for some convenience in surgical practice, we should not retain most of the cysts thus formed in the list of tumours; for their growth appears, in most instances, to be due only to the accumulation of the contents of the obstructed tube or sacculus, and to be exactly adjusted to this accumulation, and commensurate with it. Thus it is in the cases of ranula with obstruction of the submaxillary duct, and the similar dilatations of the pancreatic duct; in the cystiform dilatation of the obstructed Fallopian tube; in the dilated hair-follicles; in bursæ; and in some others. These are all conventionally reckoned among cysts and arranged with tumours: but several of the like kind

* See Fleischman, in Schmidt's Jahrbucher, 1841, B. 32, and Frerichs, Ueber Gallert-oder Colloidgeschwülste, Göttingen, 1847, p. 37.

are never so reckoned; such as the cyst-like gall-bladder, dilated with thin mucus, when the cystic duct is completely obstructed; the dilatation of the uterus, filled with serum after closure of its external orifice; the distended sheath of a tendon; and others. Convenience and common usage have decided what cysts may be grouped with those which alone, we may anticipate, will be classed with tumours when pathology becomes more accurate and strict. Convenience alone, also, decides for the omission, from so vague a class as this, of the sacs or capsules that are formed round foreign bodies and solid tumours, and of the sacs that may be formed on the free surfaces of extravasated blood or inflammatory exudation.

For the third method of formation enumerated above, a more detailed account is required; and this I will now endeavour to give.

The general structures of the cysts thus formed may be best studied in those that are so commonly found in the kidneys, or the mammary or thyroid gland, or in any instance of an ordinary serous cyst. Such a cyst, when large enough for naked-eye-examination, is usually constructed of fine, well-formed, fibro-cellular tissue, of which the filaments are commonly mingled with nuclei, or nucleus-fibres, and are variously interwoven in a single layer, or in many that are separable. The membranous walls thus formed are, in general, rather firmly connected with the adjacent parts, so that the cyst cannot easily be removed entire; and from these parts they derive the blood-vessels that usually ramify copiously upon them. They are usually, also, lined with epithelium, which is generally of the tessellated form, and may consist, according to Rokitansky, of either nuclei or nucleated cells.*

* Rokitansky says (Ueber die Cyste, p. 4) there is often no epithelium in the larger cysts, and their "inner layer is a nucleated

I am not aware that minute examinations have been made of the modes of earliest formation of any of the cysts of this kind, that are common subjects of surgical consideration; but there can be little doubt that, in their formation, they resemble the cysts of the kidney and other internal organs. In these organs the origin and progress of cysts have been profoundly studied by Rokitansky;* and I shall best describe them by giving an abstract of some of his observations, in illustration of a copy of one of his outline sketches of the minute structure of the cystic disease of the kidney. (Fig. 1.) They confirm and greatly extend the results obtained by the similar investigations of Frerichs,† and they fully establish the accuracy of the observations on the cystic degeneration of the kidney, which were made by Mr. Simon,‡ to whom pathology is indebted for the first sure step in this rich path of inquiry. They may be repeated in almost any portion of a granular kidney containing cysts, or in a choroid plexus with cysts: but, I believe, the process may be best traced in the cystic disease of the embryonic chorion—the hydatid mole, as it has been called.§ To this I shall again refer in the next lecture.

In a portion of a granular and cystic kidney, nests, as Rokitansky calls them, of delicate vesicles, from a size just visible to that of a millet-seed, may be seen imbedded in a

structureless or striated blastema, externally splitting into fibres in the direction of the long axis of the oval nuclei it contains." Epithelial cells, apparently altered so as to resemble very large cells of inflammatory lymph, are commonly found in the tenacious contents of bursæ. M. Giraldès tells me that the cysts which so often occur in the antrum are commonly lined with ciliary epithelium.

* Ueber die Cyste. Wien, 1850.

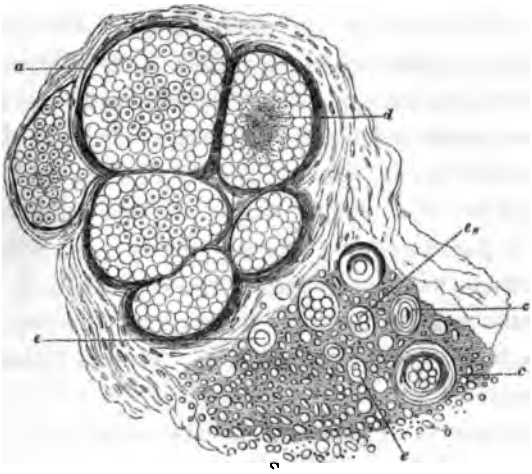
† Ueber Gallert-oder Colloidgeschwülste.

‡ On Subacute Inflammation of the Kidney, in the Medico-Chirurgical Transactions, vol. xxx.

§ Mettenheimer, in Müller's Archiv, 1850.

reddish-grey or whitish substance. These differ in size alone from the larger cysts to which one's attention would be sooner attracted; and, on the other side, it is only in size that they differ from many much smaller. For if a portion of such a nest be examined with the microscope, one finds, together with the débris of the kidney, variously diseased it may be, a vast number of vesicles or cysts that were invisible to the naked eye.

Fig. 1.



The most striking of these have a wall consisting of layers of fibres scattered over with curved nuclei (*a*), and are filled with granulated nuclei, or, more rarely, with round or polyhedral cells, some of which may contain a molecular or granular pigmental matter, (*d*.) In many of these cysts, the nuclei or cells are reduced to an epithelial lining of the cyst; and in some even this is absent, and the "barren" cyst is filled with a clear or opaline adhesive fluid.

From the size just visible to the naked eye, such cysts vary to $\frac{1}{500}$th of an inch in diameter; and, together with these, are cysts whose walls (though their contents are like those of the others) consist of a structureless hyaline membrane: and these lie in a stroma which is equally simple, but seems to develop itself gradually into a fibrous structure circumscribing the cysts.

Moreover, one finds, in the same specimens, (as in the lower part of Fig. 1,) structures of the most various sizes, which, except in size, agree completely with the last-mentioned simple and structureless vesicles, and show every grade of size down to that which is just larger than a nucleus. The smallest of these contain a clear fluid, or are slightly granulated: in the larger there is a central nucleus, and to this are added a second, a third, and a fourth nucleus, and so on till there appear several, which fill up the commensurately enlarged vesicle, (*e, e, e,* &c.) Now, in such a nucleus seems to lie the nucleus of the history of development of those autogenous cysts, not in the kidney alone, but in any part in which they may occur. A nucleus grows to be a cyst, whether a simple or barren one, or one that has an endogenous production of nuclei, or cells, or any other structures. And, perhaps, in the same specimen, the earlier history of the nucleus itself may be traced; for one sees, (as in the same figure,) together with the nuclei, still smaller corpuscles of all sizes, down to that of the elementary granule so-called; and these, the larger they grow, the more are they like nuclei; so that, perhaps, the progress of the disease is from these granules, enlarging to the formation of nuclei, and thence pursuing some abnormal course.

It would be tedious now to trace, from this general sketch of their origin, all the phases through which such cysts may pass. Rokitansky has done it amply. We have here the elementary constituents. But the simple cyst-wall is capable, not only of growing, but of acquiring, by appropriation and development of surrounding blastema, the laminar and nucleated fibrous tissue which we find in its full estate;

acquiring these, we may presume, just as, more normally, the simple membranous wall of a new blood-vessel acquires, as it grows, the nuclei and fibrous tissue that belong to its more perfect state. Such might be the least abnormal course of any cyst: but from this it may deviate; thickening, acquiring continually new layers, calcifying, and in other ways showing the signs of degeneration or disease. The contents, also, of the cyst may assume even yet more various forms: to name only the extremes—they may retain the simple state of liquid; or with liquid there may be a simple, or a specially secreting, epithelial layer; or, a series of successively enclosed nuclei or cells may be formed within that which first enlarges; or, the contents may acquire the structure of well-organized glands, or of cancer, or some other tissue; and between these extremes, according to conditions which we have no power to trace or explain, they may pass in any of the manifold ways of wrong, the ends of which I shall have to describe.

Important as the history of cysts may be in its direct bearings, yet these are not all that we may observe in it. In their history I cannot but think we may discern an image of the first form and early progress of many innocent solid tumours also. For, as the cyst is traced from the mere nucleus, or even from the granule, onwards to its extreme size or complexity of structure or contents, so, it is very probable, from the numerous correspondences between them, that these solid tumours also have a similar beginning in some detached element, or tissue-germ, or in some group of such germs, which, in their development and growth, may coalesce, and then may appropriate, or exclude for absorption, the intervening substance.

Thus, in the form of erring nuclei, we may, I think, almost apprehend the structural origin of these cysts and tumours: yet, if we may, the question still remains whether the elementary structures in which they begin be some new and special morbid elements, or some natural rudimental structures perverted from their normal course. Mr. Simon, speaking of the cysts of the kidney, regards them as "vesicular transformations of the ultimate structure of the gland;" and to this view, without adopting some ingenious suppositions which he has connected with it, I would adhere. For, unless a cyst or a solid tumour (assuming this mode of their origin to be correct) were really a transformation of a nucleus, or a cell, of the part in which it grows, we could not understand the very general similarity that we find between the contents of certain cysts and the secretions or structures of the glands in or near which they occur; nor yet the likeness which commonly exists between the solid tumour and the tissue in which it is imbedded. These things are as if the first beginning of the abnormal growth were in some detached element of the natural tissue, which element, being perverted from its normal course, thenceforward multiplies and grows, conforming with the type in minute structure and composition, but more and more widely deviating from it in shape and size.

Such are the facts, and such the speculations that we may entertain, respecting the origin, or, at least, the smallest visible beginning, of a cyst or an innocent solid tumour. Need I add that if even this be true, we are yet far from the explanation of the cardinal point in the pathology of tumours—their continual growing. Why should these detached tissue-germs, or any less minute and less isolated portion of an organ, grow while all other germs and parts that are most like them remain unchanged? I have already confessed my ignorance.

I will endeavour now to illustrate the histories of particular forms of the simple or barren cysts.

1. The first that may be enumerated are GASEOUS CYSTS. I know, indeed, concerning them only the specimens placed by Hunter in his museum;* but these should be admired, or almost venerated; for their histories include the honourable names of Hunter, of Jenner, and of Cavendish. Mr. Hunter says of them,—"I have a piece of the intestine of a hog, which has a number of air-bladders in it." . . . "It was sent to me by my friend Mr. Jenner, surgeon, at Berkley, who informed me that this appearance is found very frequently upon the intestines of hogs that are killed in the summer months.". . . . "Mr. Cavendish was so kind as to examine a little of this air; and he found 'it contained a little fixed air, and the remainder not at all inflammable, and almost completely phlogisticated'."†

What a relic have we here! Surely, never, on an object so mean to common apprehensions, did such rays of intellectual light converge, as on these to which were addressed the frequent and inquiring observation of Jenner, the keen analysis by Cavendish, and the vast comparison and deep reflection of John Hunter! Surely, never were the elements of an inductive process combined in such perfection! Jenner to observe; Cavendish to analyse; Hunter to compare and to reflect.

2. The SEROUS CYSTS, or Hygromata, are, of all the order, the most abundant. The term includes nearly all such as have thinly liquid, or honey-like contents, of yellow, brown, or other tint. Their most frequent seats are, by a hundred-fold majority, in or near the secreting glands or membranes, or the so-called vascular glands; but there is scarcely a part in which they may not be found. Their

* Museum of the Coll. of Surg., No. 153-4.

† See Hunter's Works, vol. iv. p. 98, and Description of Pl. xxxvii.

frequency in connection with secreting structures has led some to hold that they are all examples of perverted epithelial or gland-cells; but their occurrence in such parts as bones and nerves, among deep-seated muscles, and in fibrous tumours, makes it sure that they may originate independently of gland-cells;* though why any element of a solid tissue should retain the vesicular form which it has in its germ-state, and in that form grow, we cannot tell.

Of this numerous group of serous cysts, however, I will speak at present of only such as may best illustrate their general pathology, and are of most importance in surgical practice; and I will, to these ends, refer chiefly to the cysts in the neck, the mammary gland, and the gums.

Single serous cysts in the neck form what have been called "hydroceles of the neck," and are well exemplified by a specimen in the Museum of the College.† This is a single oval cyst, with thin, flaccid, membranous walls, which even now, after shrinking, measures more than six inches in its

* Some very interesting specimens of serous cysts in bones are in the Museum of St. George's Hospital. They are described by Mr. Cæsar Hawkins, in his Lectures on Tumours, in the Medical Gazette, vols. xxi. xxii.; and in a Clinical Lecture in the same, vol. xxv. p. 472. See, also, a remarkable case by Vanzetti, in Schuh (Pseudoplasmen, 175). There are some remarkable specimens of cysts in the antrum, in the Museum of St. Thomas's Hospital, prepared by Mr. Wm. Adams, who showed them to me. M. Giraldès considers all such as these to be formed by cystic disease of the gland-structures discovered by him in the mucous membrane of the antrum.

† Mus. Coll. Surg. 146. Many well-marked examples of the disease in all its forms are recorded by Dr. O'Beirne (Dublin Jour of Med. and Chem. Sc. vol. vi. p. 834); Mr. Lawrence (Med.-Chir. Trans. vol. xvii. p. 44); Mr. Cæsar Hawkins (Med.-Chir. Trans. vol. xxii. p. 231); Mr. Liston (Practical Surgery, p. 330, ed. 1846); and others. A monograph by Wernher (Die angeborenen Cysten-Hygrome, Giessen, 1843) is referred to by Bruch, l. c., but I have not been able to see it.

chief diameter. It was successfully removed by Mr. Thomas Blizard from between the platysma and sterno-mastoid muscles; and a part of it is said to have passed behind the clavicle. It was filled with a clear brownish fluid.

Such cysts, but various in size and other characters, are more apt to occur in the neck than in any other part of the body. Many are single cysts like this; but others are complex, having many cavities, whether separate or communicating; and some consist of very numerous cysts, even of hundreds, clustered in one comparatively firm mass.

In situation, too, they are various. In some cases they lie in the front of the neck; in others, at one or both sides: they may lie by the lower jaw, over the parotid, by the clavicle, or anywhere or everywhere in the mid-spaces. And in any of these situations they may extend very deeply among the structures of the neck, and may adhere to them so closely, and may so thinly cover them, as scarcely to conceal them when laid open. Their date of origin is often obscure. In many, perhaps in the majority of cases, they appear to be congenital; but they may be first observed at any later period of life. Last year Mr. Lawrence removed a collection of four large cysts from over the parotid gland and mastoid region of a man, twenty-eight years old, who had observed their beginning only seven years previously. Three of these were filled with serum, and one with pus.

Of course, in such a variety of forms, there must be more than one kind, in the group of cysts that are thus, for mere convenience, placed together. The variety of origins, indeed, to which cysts in the neck may be traced, gives them peculiar interest in relation to the general pathology of cysts.

Some are evidently connected with the thyroid gland; though, being singly developed, and growing to a very large size, their relation to it may be at length obscured, and they may appear, during life, quite isolated. A woman, forty-eight years old, was under Mr. Vincent's care, in St. Bartholomew's Hospital, in July 1841, with a tumour in the front of her neck as large as the head of a child two years old. The tumour contained fluid, which was twice withdrawn with a trocar. At the first time the fluid looked like serum, but coagulated spontaneously; at the second, it was mixed with blood. After the second operation the cyst inflamed and discharged grumous and sanious pus; but it also enlarged quickly, and the patient died unexpectedly, and rather suddenly, suffocated.

The preparation* displays a cyst occupying nearly the whole right lobe of the thyroid gland: its walls are nearly two lines in thickness; its cavity was full of lymph, pus, and blood; and the sudden death was due to a discharge of a great part of its contents into the pharynx and larynx, through an ulcerated aperture into the former.

Besides these cysts which lie within the thyroid gland, some that lie near to it are very probably of the same nature; cysts formed in some out-lying portion of the gland, such as I referred to in the last lecture. But of this mode of origin we can scarcely have a proof when the cyst is fully formed and largely grown.

Other of these cysts in the neck appear to be transformations of vascular tumours; *i. e.* of erectile vascular growths or nævi. I shall refer to this point again: it is made probable by the close connection which some of these cysts have with large deep-seated veins; by the occasional opening of blood-vessels into their cavities; and by their sometimes distinctly forming portions of vascular nævi. A girl, three and a half years old, was under Mr. Lawrence's care, in 1849, in St. Bartholomew's Hospital, with a large soft

* Museum of St. Bartholomew's Hospital, Ser. xxii. No. 16.

and obscurely fluctuating tumour covering the greater part of the left side of the neck, and the lower part of the cheek. Such a swelling had existed from birth, but it had of late enlarged very much. It was composed of a cluster of close-set cysts, containing spontaneously coagulable fluid; but at its upper part a firmer portion of its mass consisted of a collection of tortuous and dilated blood-vessels, like those of a nævus. The examination made of it, by Mr. Coote,* after its removal, was such as to leave little doubt in his mind that it had origin in or with a nævous growth; and other cases, to which I shall refer in speaking of erectile tumours, have confirmed this view, especially some of those which are published by Mr. Hawkins.

But when we have separated all the serous cysts in the neck that may be referred to these two sources, there will probably still remain many that we can assign to no such mode of origin, and which at present we must class among primary or autogenous cysts, independent of any secreting structure.

Among these are some with fluid contents of peculiar viscidity, ropy, or honey-like, and deriving a peculiar aspect from including abundant crystals of cholestearine. Such contents may occur, perhaps, in any cyst in the neck or elsewhere; but they appear to be comparatively frequent at or near the front of the larynx. In the College-Museum there is such a cyst,† attached to the hyoid bone of a sailor, who was between fifty and sixty years old, and in whom it had existed nearly as long as he could remember. It contained a

* Lecture, by Mr. Lawrence, in the Medical Times, November 30, 1850.

† Mus. Coll. Surg. 148. These, I presume, are examples of Meliceris. The cysts which Müller describes under the name of cholesteatoma are quite different from these, and will be noticed with the cutaneous cysts in the next lecture.

brownish-yellow, grumous, honey-like fluid, with abundant crystals of cholestearine.

In 1849, Mr. Lawrence had, at St. Bartholomew's Hospital, a patient, thirty-five years old, on the left side of whose neck, directly over and closely attached to the thyrohyoid membrane, was a smooth oval tumour, about an inch in length. He had observed a regular increase of this tumour for five or six years; but its bulk and deformity alone were inconvenient. Mr. Lawrence freely cut into it, and let out a thick honey-like fluid, in which large groups of crystals of cholestearine were visible even with the naked eye. The cyst, after the incision, suppurated, and then the wound healed, and the patient left the hospital quite well: but I have lately seen him with an appearance as if some remains of the cyst were again filling.

Cysts like the last-described are not uncommon in or near the gums, lying usually behind the reflection of the mucous membrane from the gum to the cheek. Their occasional large size, and their thick tough walls obscuring the sense of fluctuation, may make them at first look formidable. A woman, thirty-eight years old, was under my care in 1849, in whom, at first sight, I could not but suppose something was distending the antrum, so closely was the deformity of the face due to such diseases imitated. But the swelling was soft and elastic, and projected the thin mucous membrane of the gum of the upper jaw, like a half-empty sac. I cut into the sac, and let out nearly an ounce of turbid brownish fluid, sparkling with crystals of cholestearine. The posterior wall of the cyst rested in a deep excavation on the surface of the alveolar border of the upper jaw; an adaptation of shape attained, I suppose, as the result of the long-continued pressure of the cyst, which had existed six years.

At nearly the same time a young man was under my care with a similar swelling of larger size, which he ascribed to an injury of the gum or alveolar border of the upper jaw only six months previously. In neither of the cases could I find any disease of the maxillary bone; but it sometimes exists in intimate connection with these cysts, and sometimes the fang or socket of the nearest tooth appears diseased. I lately saw a lady in whom a small cyst of this kind had existed twenty-seven years, almost daily discharging and refilling. It had its origin in a blow by which the two median upper incisors were loosened. One of them was again firmly fixed; the other had remained slightly loose, and its crown was dark.

In no organ is the formation of cysts more important than in the mammary gland. Every variety of them may be found here: but I will speak at present of only the serous cysts.

Some of these cysts are dilated ducts, or portions of ducts grown into the cyst-form. During lactation, cysts thus derived may be filled with milk, and may attain an enormous size, so as to hold, for example, a pint or more of milk.* In other cases they may contain the remains of milk, as fatty matter, epithelial scales, &c.; or they may be filled with transparent watery fluid, without coagulable matter;† but much more commonly they contain serous fluid, pure, or variously tinged with blood or its altered colouring matter, or various green, or brown, or nearly black fluids.‡

* See a case by M. Jobert de Lamballe, in the Med. Times, Jan. 4, 11, 1845; and a collection of cases by Mr. Birkett, in one of which ten pints of milk were evacuated (Diseases of the Breast, p. 201).

† Brodie, Lectures on Pathology and Surgery, p. 155.

‡ Their various contents are well shown in Cooper's Illustrations

The complete proof of the origin of some of these cysts as dilated portions of ducts, is, that by pressure they may be emptied through the nipple, or that bristles may be passed into them from the orifices of tubes. But although these facts may be often observed, yet I agree with Mr. Birkett in thinking that the majority of cysts in the mammary gland are formed in the manner of the renal cysts, to which, indeed, they present many points of resemblance.

The most notable instances of mammary cysts are those in which the whole of the gland is found beset with them. This may occur while the proper substance of the gland appears quite healthy;* but I think it is more commonly concurrent with a contracted and partially indurated state of the gland; a state which, independent of the cysts, appears similar to cirrhosis of the liver, and has, I think, been named cirrhosis of the mammary gland. Its coincidence with cysts proves its nearer relation to that shrivelled and contracted state of the granular kidney with which the renal cysts are so commonly connected; or (when the cysts are formed by partial dilatation of the ducts), to the shrivelled, indurated state of the lung that may coincide with dilatation of the bronchi.

The cysts in these cases are usually of small size, thin-walled, full of yellow, brown, green, and variously deep-coloured fluids; fluids that are usually turbid, various in tinge and density, but not usually much denser than serum. They do not lie in groups, but are scattered through, it may be, the whole extent of the gland; and their walls, though

of Diseases of the Breast, pl. i.; and a full account of all the diseases of this class is given by Mr. Birkett in his work already cited.

* Two such cases are described by Sir B. C. Brodie (Lectures on Pathology and Surgery, p. 139).

thin, are tough and tense, and very closely adherent to the surrounding gland-substance. Similar small cysts are sometimes found in connection with hard cancer of the breast; and in this case they have been called by Mr. Hunter and others "cancerous hydatids:" but their proper relation in such cases appears to be, not with the cancer, but with the coincidently shrivelled gland.

In this disease of the mammary gland there is no reason to believe a malignant nature, though the coincidence with cancer appears not rare. Yet the diagnosis between it and cancer is not always clear, and many breasts have been removed in this uncertainty. I once saw such a case, and it ended fatally. A woman, fifty years old, had, in her left breast, just below the surface of the mammary gland, a small, smooth, oval, and moveable tumour. It felt firm, but not hard; but, external to it, in a line extending towards the axilla, were two or three small round "knots," scarcely so large as peas, and quite hard. In the axilla was an enlarged gland. The breast was soft, flaccid, and pendulous. The tumour was sometimes painful, and a serous and bloody fluid often flowed from the nipple. The patient's youngest child was sixteen years old, and the tumour had been noticed six months, having arisen without evident cause. There was doubt enough about the diagnosis of this case to suggest that the tumour should first be cut into. An incision exposed the cavity of a cyst full of dark, turbid, greenish fluid, and near it many more cysts. Similar cysts pervaded the whole extent of the gland, and the whole breast was therefore removed. Many of the cysts communicated with lactiferous tubes, from which bristles could be passed through the nipple.*

* In the Museum of the Middlesex Hospital is a breast from a

In this case one comparatively large cyst existed, with many of much smaller size. In more usual cases one cyst has a yet greater predominance over others, or even exists alone. Sometimes, in such instances, the removal or laying open of one large cyst has been sufficient; but in some, smaller cysts neglected have enlarged, and the disease has appeared to recur.*

The single cysts of the mammary gland may become enormous. I know not what boundary may be set to their possible size; but I find one case in which nine pounds of limpid "serosity" were produced in three months in the breast of a woman thirty years old.† In this case the walls of the cyst were thin, and the fluid serous; and the fact illustrates a general rule, that the cysts which contain the simplest fluids, and which have the simplest walls, are apt to grow to the largest size: thickening of cyst-walls, and, much more, their calcification,‡ are here, as elsewhere, signs of degeneracy, and of loss of productive power.

It would appear as if any cyst of the mammary gland might, after some time of existence in the barren state, become prolific, and bear on its inner surface growths of glandular or other tissue. But of these proliferous cysts I will speak in the next lecture.§

woman in whom both mammary glands were thus diseased. In the College-Museum, Nos. 151 and 152 best illustrate the disease.

* Sir B. C. Brodie, loc. cit. p. 146, note.

† Case by M. Marini, cited by M. Bérard, "Diagnostic différentiel des Tumeurs du Sein," p. 86.

‡ For a case in which the walls of a cyst in the breast were calcified, and crackled like those of ossified arteries, when pressed, see Bérard, loc. cit. p. 56.

§ Having in view only the illustration of the more general pathology of these cysts, I have not referred to more special instances of them. Examples enough are to be found in all the works here quoted. Neither have I mentioned any analysis of the contents of serous cysts;

3. Of Synovial Cysts I need say very little. Under the name may be included all the anormal bursæ, or ganglions, as they are called. In these, again, two methods of formation probably obtain. Some, of which the best example is the bursa over the patella and its ligament, are merely enlargements, with various transformations, of bursæ naturally existing. Not materially different from these are the bursæ which form anew in parts subjected to occasional localized pressure, and which appear to arise, essentially, from the widening of spaces in areolar or fibro-cellular tissue, and the subsequent levelling or smoothing of the boundaries of these spaces. But others, such as the bursæ or ganglions which form about the sheaths of the tendons at the wrist, appear to be the cystic transformations of the cells inclosed in the fringe-like processes of the synovial membrane of the sheaths. The opportunities of dissecting these are rare; but I believe there is a close resemblance, in mode of formation, between them and the cysts of the choroid plexus. Rokitansky has shown that these are due to cystic growth in the villi appended to the margins of the plexus, which villi are very similar, in their constituent structures, to the processes of the synovial fringes. And the probability of similar origin is enhanced by the likeness of the contents of the cysts, in both cases, to the fluids secreted by the fringes in the normal state.

4. Under the name of Mucous Cysts we may include

for few have been made, and these few were made on such various materials, that no general account of them can be rendered. Several are cited in Simon's Medical Chemistry; and in Frerichs' Ueber Gallert- oder Colloidgeschwülste, p. 7—9, &c.; and by Virchow, in the Verhandlungen der med.-phys. Gesellsch. in Würzburg, B. ii. p. 281. See, also, on the contents of ovarian cysts, Dr. Tilt's papers in the Lancet, June 1850.

all such as are formed in connection with simple mucous membranes, or with glandular structures which we call mucous, while we know no other or peculiar office served by their secretions.

There may be many cysts of this kind; but the best examples appear to be those that may be named *Nabothian* and *Cowperian* cysts. The former probably originate in cystic degeneration of the glands of the mucous membrane about the cervix uteri. Protruding, either alone, or with polypoid outgrowths of the mucous membrane, they are observed successively enlarging, then bursting and discharging their mucous contents, and then replaced by others following the same morbid course. Or, instead of clusters of such cysts, one alone of larger size and simpler structure may be found.*

The Cowperian cysts appear to be connected with the Cowper's or Duvernoy's glands in the female. Whether arising from dilatation of the duct, or from cystic transformation of the elementary structures of the gland, cannot be yet stated; but, in the exact position of the Cowper's gland, and projecting into the vagina near its orifice, a cyst is often found, of regular oval shape, thin-walled, of uncertain size, but growing sometimes to the capacity of a pint. Commonly the contents of such a cyst are a colourless, pellucid, or opaline ropy fluid, like that found in the closed-up gall-bladder. But from this they often vary. I have seen the contents of such cysts like the ink of the cuttle-fish, like the fluid of melanotic tumours, and like thick turbid coffee; or, to the sight, they may exactly resemble fluid fæcal matter.† Moreover, these cysts are very apt to inflame and

* A remarkable example of a cyst thus, I suppose, originating, is in the Museum of the Middlesex Hospital.

† As in a case related by Mr. Cæsar Hawkins in his Lectures, Medical Gazette, vol. xxi.; and in two cases by Lebert, Abhandlungen, p. 109.

suppurate. Many abscesses projecting into the vagina have in these their origin; and the treatment these abscesses receive, by free incision, is, I believe, appropriate for the cysts under all conditions.

It is not apparent upon what the varieties in the contents of these cysts depend. The only instances that I could minutely examine were the two following:—In the first, a woman, 25 years old, under the care of Dr. West, had a smooth oval swelling in the lower and fore part of the right labium, projecting on its inner surface, and nearly an inch in diameter. This had been observed slowly increasing for six years, and had commenced three months after parturition. It was not painful. I punctured it, and let out about three drachms of pellucid fluid, like mucus, or the white of egg. The cyst had a polished white internal surface, and the fluid contained numerous corpuscles, like very large white blood-corpuscles, and like such as are commonly found in the tenacious fluid of bursæ. The cyst closed on the healing of the wound: but two years afterwards either it, or some other part of the gland similarly diseased, appeared again.

In the other case, the patient was forty-five years old, and under the care of Mr. Stanley. The tumour was nearly regularly oval, occupying the whole length of the right labium, and obstructing the vagina. She had observed it increasing for four years: it was painless, but had been often struck. A free incision gave issue to about fourteen ounces of thick, inodorous, dark brown fluid, like turbid coffee. The walls of the cyst were about one-third of a line thick, tough, compact, and closely connected with the surrounding tissues. Mr. Abernethy Kingdon, who examined the contents, found abundant molecular matter, and granule-masses, together with groups of cells, apparently resembling epithelial cells of various sizes.

5. The SANGUINEOUS CYSTS, or cysts containing blood, are, probably, in many instances, very nearly related to the serous. Some may be explained by an accidental hæmorrhage into the cavity of a serous cyst; an event corresponding with the transformation of a common hydrocele into an hæmatocele. The contents of some of these cysts are, indeed, just like those of an hæmatocele, with fluid and coagulated and variously decolorized blood.* But some cysts appear, from their origin, to contain blood; and this blood, I think, always remains fluid till it is let out, while that which collects by hæmorrhage into a serous cyst is generally partially or wholly coagulated. Some of these cysts with blood are found in the same positions and circumstances as the serous. Thus, in the neck, a series of cases of blood-cysts might be collected, exactly corresponding with the serous cysts in that part, and, like them, probably derived from various origins, some lying in the thyroid gland, some near it, some traceable to connection with vascular nævi, some of proper origin.

Of the last class one appeared to be, which was in St. Bartholomew's Hospital several years ago. A lad, about sixteen years old, was under Mr. Stanley's care, with a large, oval, and somewhat pendulous swelling in the left side of the neck, which had existed many years, and appeared merely subcutaneous. It was punctured, and about sixteen ounces of fluid blood escaped, which soon coagulated. After this the cyst closed; a result more favourable than may generally be anticipated from such simple treatment: for usually these, like other, cysts are not obliterated unless after free incision.

* Such hæmorrhages are frequent in cysts of the thyroid gland (Frerichs; Rokitansky; Museum of the College of Surgeons, 1502). Thus, also, we may explain the hæmatoceles of the spermatic cord, as in Mus. Coll. Surg. 2460; and Mus. St. Bartholomew's, Ser. xxviii. 11.

In the parotid gland, also, cysts containing fluid blood have peculiar interest. In 1848, I assisted Mr. Stanley in the removal of one which lay quite within the parotid of a gentleman about 40 years old. It had been for some years increasing in size, and lay beneath some branches of the facial nerve, from which the need of separating it without injury made its removal very difficult. This, however, was safely accomplished, and the patient remains well.

At nearly the same time, a man, 25 years old, was under my care with a similar cyst, which had been increasing without pain for two years. It lay in the parotid, but very near its surface. I punctured it, and evacuated two or three drachms of bloody-looking fluid, with some grumous and flocculent paler substance intermingled. This fluid coagulated like blood, and contained blood-cells, much free granular matter, crystals of cholestearine, and what appeared to be white corpuscles of blood acquiring the character of granule-cells. The cyst filled again with similar fluid after being thus evacuated: I therefore dissected it from the parotid gland, and the patient recovered.

Occasionally, one meets with sanguineous cysts, which derive a peculiar aspect from a columnar or fasciculated structure of their interior, making them look like the right auricle of a heart. This was singularly the case in one which I assisted Mr. Macilwain in removing from over the lower angle of the scapula of a lad 15 years old. It had existed more than eight years, and grew rapidly, while, in the last year, he was actively at work. It was now also painful. It felt like a fatty tumour, but proved to be a cyst thus fasciculated like an auricle, with a finely polished internal surface, and containing about an ounce and a half of liquid blood. Its walls were from one to two lines in thickness, and seemed in great part made up of small cells, such as one sees in a bronchocele, full of serous and bloody fluids. No trouble followed the operation, and the patient remains well twelve years after it.*

A cyst presenting the same peculiarity of internal surface was removed by Mr. Stanley, in October 1848, from over the pubes of a boy 13 years old. It was observed increasing for nine months, and part of it, consisting of a simple thin-walled serous cyst, was transparent; but behind, and projecting into this, was a more thickly walled cyst, containing about a drachm of dark liquid blood, and on its surface fasciculate and polished like an auricle. Its walls were well defined, formed of fibro-cellular tissue imperfectly filamentous and nucleated, and I could find no epithelium lining it. The operation was successful.

It is not improbable, I think, that both these cases may have had their origin in vascular nævi, like other cysts containing blood, to which I shall refer in speaking of erectile tumours. I will now only refer to certain cysts which, without any erectile formation, appear to be derived from portions of veins dilated, and obstructed, and shut-off from the stream of blood. Such an one was removed by Mr. Lloyd, many years ago, from a man's thigh. It lay in the course of the saphena vein; but neither that, nor any other considerable vein, was divided in the operation, or could be traced into the cyst. This cyst † was of spherical form, about an inch and a half in diameter, closed on all sides; its walls were tough, and polished on their inner surface; it was full of dark fluid blood, and its venous character was manifested by two valves, like those of veins, placed on its inner surface. On one of these a soft lobed mass, like an intra-cystic growth, is seated.‡

* The cyst is in the Museum of St. Bartholomew's, Ser. xxxv. 38.

† Museum of St. Bartholomew's Hospital, Appendix, 10.

‡ In the Museum of King's College is a large cyst removed from a thigh, into which it is said the saphena vein opened.

6. CYSTS containing OIL or fatty matter, without any more highly organized substance, are very rare. Many contain fatty matters mingled with serous, epithelial, and other substances; but in these the fatty constituent is probably the result of the degeneration of the other contents. Some, however, appear to contain fatty matter alone. Mr. Hunter preserved a specimen* of what he marked as "oil from an adipose encysted tumour." It was taken, I believe, from a cyst that grew "between the bony orbit and the upper eyelid" of a young gentleman. When recent, it was described as "pure oil, perfectly clear and sweet, which burnt with a very clear light, and did not mix with aqueous fluids, and, when exposed to cold, became as solid as the human fat."

In 1850 Mr. Wormald removed a small cyst from a woman's breast, the contents of which appeared to be pure oily matter, that congealed into a substance like lard, and contained crystals of margarine, but no organized corpuscles. The patient remains well. Schuh† relates two cases of cysts under the brow, which contained similar oily matter, and whose walls had all the structures of skin, with implanted hairs.

7. COLLOID CYSTS are, at present, a very ill-defined group; the term "colloid" being used by Frerichs,‡ and other recent German writers, for all those morbid materials that are pellucid, jelly-like, flickering, half-solid, or more or less closely resembling the material found in gelatiniform, alveolar, or colloid cancer. Such a material is common in the cysts of bronchoceles, and in those of the kidney;

* Mus. Coll. Surg., 181: Pathological Catalogue, vol. iv. p. 177.

† Ueber . . . Pseudoplasmen, p. 144.

‡ Ueber Gallert- oder Colloidgeschwülste.

especially, I think, in those which are not associated with contraction of the renal substance, and which Baillie, and other writers of his time, described as hydatid disease of the kidney.

The contents of these cysts may present the most diverse conditions; may be of all densities, from that of dilute serum to that of a firm jelly; may range between pellucidity and the thickest turbidness; may be of all hues of yellow, olive-green, orange, brown, pink, and nearly black. The thick and pellucid contents of such renal cysts are enumerated as examples of colloid matter; so are the contents of ranulæ, and of many bursæ; but the type is the material of the so-called colloid cancer. This, however, is beyond my present range; and I pass by it, referring only to the already cited works of Frerichs and Rokitansky, and to that of Bruch,* for the best information yet supplied.

8. The last group of cysts of which I shall now speak includes such as contain secreted fluids, like those of the glands, by the dilated ducts or transformed elements of which they are formed. Such are the cysts in the breast that contain milk, and probably many instances of ranula. The origin of the former is, probably, in dilatation of lactiferous ducts; that of the latter is uncertain. But the examples of this group, of which I wish more particularly to speak, are the SEMINAL CYSTS, including under this name those that are usually called encysted hydroceles, or hydroceles of the spermatic cord. Their various forms are fully described by Mr. Curling, † and are well illustrated by specimens in the Museum of the College.‡ They are

* Ueber Carcinoma alveolare und den alveolären Gewebstypus; in Henle and Pfeufer's Zeitschrift, vii. 1849.

† Treatise on Diseases of the Testis, &c.

‡ Especially Nos. 2456 to 2459.

usually thin-walled spherical or oval cysts, imbedded in, and loosely connected with, the tissue of the cord. They may occur singly, or in a group. Their most frequent seat is just above the epididymis, but they may be found in any part of the spermatic cord. Their walls are formed of fibro-cellular tissue, and they may be lined with delicate tesselated epithelium. Their contents are usually a colourless slightly opaline fluid, like water with which a little milk has been mingled.

The discovery was made at the same time, and independently, by Mr. Lloyd and Mr. Liston, * that the fluid obtained from these cysts usually contains the seminal filaments or spermatozoa. Repeated observations have confirmed their discovery; and both the existence of these bodies, and the usual characters of the fluid, justify the speaking of it as a diluted or imperfect seminal fluid, and, therefore, of the cysts as "seminal cysts."

It was my lot, I believe, first to dissect some of these cysts;† and I found that they had no open communication or other connection with any part of the secretory apparatus of the testicle, and that their relation to the epididymis, on which they lay, was such as to forbid the supposition of the seminal secretion being transmitted to them from the tubes. I suggested, therefore, that these cysts were formed quite independently of the tubes; and that, being seated near the organ that naturally secretes the semen, they possessed a power of secreting a similar fluid; just as cysts beneath the hairy parts of the body may produce hair and epidermis, and the ordinary products of the skin. The explanation was, I believe, deemed unsatisfactory; but it is supported by the later investigations of other cysts, especially of those

* Medico-Chirurgical Trans., vol. xxvi. pp. 216 and 368. See, also, a paper by Mr. Curling, in the Monthly Journal of Med. Science, x. p. 1023.

† Medico-Chirurgical Transactions, vol. xxvii. p. 398.

to which I have already referred, growing in the thyroid and mammary glands. While we find in these that perfect gland-substance may grow from the cyst-walls, it cannot seem singular if, in a cyst lying near the testicle or its duct, materials like the secretion of the testicle should be formed. The growth and nutrition of gland-tissue, and the formation of gland-secretion, are so truly parts of one process, that the proof of the former occurring in one group of cysts removes all improbability from the belief that the latter may occur in another group.

If, then, we may regard these seminal cysts as autogenous, and may arrange them with those of the kidney and other glands, which are derived from the transformation and overgrowth of isolated nuclei or cells, they may supply some facts of interest to the general pathology of cysts. Especially, we may observe that in different specimens of these "hydroceles of the cord," or in the same at different times, the contents may be either a seminal fluid or an ordinary serous fluid. In one of the cases in which I dissected a seminal cyst, there existed, besides that which contained seminal fluid, another larger cyst, above and separate from the testicle and tunica vaginalis; but this contained only serous fluid like that of a common hydrocele. Now this diversity is common among cysts. Those in the kidney may contain the materials of urine, but they more commonly do not; those of the lactiferous tubes may contain either milk or some form of serous fluid; ovarian cysts may at one period produce hair and the other growths and secretions from skin, and then, casting off these, they may produce only serous or some other fluid.

In different cysts, this diversity of contents may sometimes depend on difference of origin or of early construction. But when it happens in different periods of the same cyst, it illustrates the general rule that, in the course of time, cysts are apt to degenerate, and to produce less and less highly organized substances or secretions. This degeneration does not take place in any certain time; but generally, the larger a cyst grows, the less organized are its products; as if nearly all the formative force were expended in growth, and little remained available for secretion. Generally, also, the longer a cyst has lived, the less organized are its products. However, both these rules are only general. I met with a remarkable exception to them in a seminal cyst, which had existed for seven or eight years in a man more than 70 years old. I withdrew from it eighteen ounces of fluid laden with seminal filaments; and no fresh accumulation took place in the two years following the operation. In another case, of four years' duration, Mr. Stanley removed from a cyst on the right side of the scrotum 25 ounces of such fluid, and from one on the left side 46 ounces.

I have spoken of these seminal cysts as separate from the testicle and tunica vaginalis. Mr. Lloyd believed that, in some cases, he obtained fluid containing spermatozoa from hydroceles of the tunica vaginalis; and his belief was lately confirmed by the examination of a case after death. The specimen presents the ordinary appearances of a common hydrocele, except that the inner surface of the tunica vaginalis is uneven, with a few small depressions or pouches from it. This hydrocele had been repeatedly tapped; the fluid had always the ordinary serous appearance of that of common hydrocele; but it always contained abundant seminal filaments. Can we suppose, then, that the tunica vaginalis has the power of secreting seminal fluid? or, were there in this case minute secreting cysts, which, by dehiscence, discharged their seminal fluid into the cavity of the tunica vaginalis, as sometimes ovarian cysts by spontaneous openings discharge their contents into one another, or into the cavity of a parent cyst? I am disposed to think this latter explanation the more probable; but as yet the facts are too few to justify any conclusion.

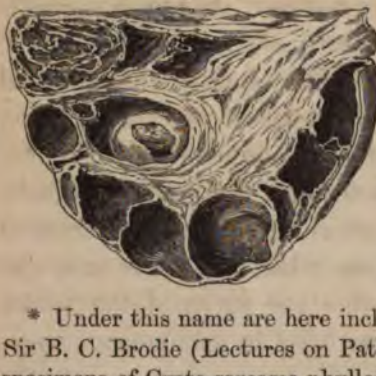
LECTURE III.

COMPOUND OR PROLIFEROUS CYSTS.

In the last lecture I traced and illustrated the formation of simple or barren cysts,—the cysts that have only liquid contents. Among these, the instances of the highest productive power appear to be in the cysts that secrete a seminal fluid, and those that are lined with a complete secreting epithelium. In the present lecture I propose to describe the cysts that appear to have the power of producing more highly organized, and even vascular, structures; or, as they may be generally named, proliferous cysts.*

These include such as are often called "compound cysts," or "compound cystoid growths;" but I would avoid these terms, because they do not suggest the difference between the cysts with endogenous growths, and those that may appear equally compound, though they are only simple cysts clustered or grouped together. This difference should be clearly

Fig. 2.†



* Under this name are here included the sero-cystic sarcomata of Sir B. C. Brodie (Lectures on Pathology and Surgery); most of the specimens of Cysto-sarcoma phyllodes and proliferum of Müller (On Cancer); and most of the tuberous cystic tumours of Mr. Cæsar Hawkins (Medical Gazette, vol. xxi. p. 951).

† Section of an ovary with many closely-placed cysts formed by enlargement of Graafian vesicles: natural size.

marked in names, for it generally is so in nature. In an ovary, for example, such as is drawn in Fig. 2, from a specimen in St. Bartholomew's Museum, it is not unfrequent to find many small cysts, formed, apparently, by the coincident enlargement of separate Graafian vesicles. These lie close and mutually compressed; and, as they all enlarge together, and, sometimes, by the wasting of their partition-walls, come into communication, they may at length look like a single many-chambered cyst, having its one proper wall formed by the extended fibrous covering of the ovary. Many multilocular cysts, as they are named, are only groups of close-packed single cysts; though, when examined in late periods of their growth, and, especially, when one of the group of cysts enlarges much more than the rest, it may be difficult to distinguish them from some of the proliferous cysts.

Of the first formation of cysts that may be proliferous I need not speak; for, so far as is at present known, they may be formed exactly as the barren cysts are. A cyst may be proliferous in whichever of the plans described in the last lecture it may have had its origin. Thus, 1. Bursæ formed by expansion and rarefying of areolar spaces may be found with organized, pendulous, or loose growths from their walls.* 2. Among the cysts formed by growth of natural cavities or obstructed ducts, we have instances of surpassing proliferous power in the ovarian cysts from Graafian vesicles, and of less power in some cases of dilated lactiferous tubes and dilated veins.† And 3. Among the autogenous cysts

* Museum Coll. Surg., 367, &c. See, also, a case by Mr. Cæsar Hawkins (Medical Gazette, vol. xxi. p. 951). Perhaps, also, the case may be here referred to, in which Mr. Hunter found loose bodies in a cavity formed round the ends of the bones in an ununited fracture (Museum Coll. Surg., Nos. 469, 470).

† Museum of St. Bartholomew's Hospital, Appendix 10; and see last lecture, p. 50.

we find, in the breast and other glands, some of the principal examples from which the following history of proliferous cysts will be derived.

The account given in the last lecture of the modes of origin of barren cysts may therefore, so far as the cyst is concerned, suffice for the proliferous; and I shall now need to speak of only the intra-cystic productions, the differences of which may decide the grouping of the whole division of proliferous cysts.

1. The first group includes the cysts which have others growing in or upon their walls. Of these, two chief examples are presented, in the complex ovarian cysts, and in the cystic disease of the chorion or "hydatid mole."

The principal varieties of the complex ovarian cysts have been described to the very life by Dr. Hodgkin, to whom we are indebted for the first knowledge of their true pathology.* But, since his minute description of them is, or should be, well known, I will more briefly say that, according to his arrangement, we may find in these proliferous ovarian cysts two principal or extreme forms of endogenous cysts; namely, those that are broad-based and spheroidal, imitating more or less the characters of the parent cyst, and those that are slender, pedunculated, clustered, and thin-walled. Between these forms, indeed, many transitional and many mixed forms may be found; yet it is convenient to distinguish the two extremes.

A typical example of the first is in the College-Museum,† and is sketched in Fig. 3. It is an Hunterian specimen; and the mode of preparation shows that Mr. Hunter had clearly apprehended the peculiarities of its structure. It is a

* Med.-Chir. Trans. xv. 256; and Lectures on the Morbid Anatomy of Serous Membrane, p. 221, et seq.

† No. 166.

large cyst, with tough, compact, and laminated walls, polished on both their surfaces. On its inner surface there project, with broad bases, many smaller cysts, of various sizes, and variously grouped and accumulated. These nearly fill the cavity of the parent cyst; many of them are globular; many deviate from the globular form through mutual compression; and within many of them are similar but more thinly walled cysts of a third order.

Fig. 3.*

Here the endogenous cysts, projecting inwards, appear to have nearly filled the cavity of the principal or parent cyst; and this filling-up is complete in another specimen, in which there remains, in the middle of the parent cyst, only a narrow space bounded by the endogenous cysts converging in their growth from all parts of the parent walls.

For a typical example of the slender, thin-walled, pedunculated, and clustered form of endogenous cysts, I may adduce the specimen from the Museum of St. Bartholomew's

* Fig. 3, section of a proliferous ovarian cyst, described in the text: about one-third of the natural size.

† Mus. Coll. Surg., No. 2622.

Hospital,* which is drawn in Fig. 4. It shows part of the thick laminated wall of an ovarian cyst, the inner surface of which is thickly covered with crowds of pyriform and leaf-like pellucid vesicles, heaped together, and one above another. This is a comparatively simple specimen of the kind: in the more complex, the endogenous cysts or vesicles are multiplied a thousand-fold, and clustered in large lobed and warty-looking masses that nearly fill the cavity of the cyst. Specimens of this kind are among the most valuable possessions of the Museum of Guy's Hospital.

Fig 4.†

The College-Museum furnishes specimens of the forms intermediate between these extremes,‡ in which the endogenous cysts of the second and third orders have walls that are not pellucid, yet are thin and vascular, and are attached by pedicles rather than by broad bases. Mixed forms are

* Series xxxi. 18.

† Fig. 4, part of the wall of a proliferous ovarian cyst described above: natural size.

‡ Nos. 165 A, and 165 B.

also found,* in which the parent cyst-wall bears, at one part, oval and spherical membranous cysts developed beneath its lining membrane, which they raise in low convex projections into its cavity; and at another part, groups of small leaf-like, narrowly pedunculated, and pendulous cysts. And, again, the same prolific power which is shown in these endogenous converging cysts, is often, in the same specimens, shown in exogenous growths; similar cysts, singly or in clusters, projecting from the exterior walls of the parent.†

But a lecture would not suffice to describe, even briefly, the variety of forms into which these ovarian proliferous cysts may deviate. Whether we regard their walls, the arrangement and shape of the endogenous cysts, their seats and modes of origin, their various contents, and the yet greater differences engendered by disease, they are so multiform that even imagination could hardly pass the boundaries of their diversity. It must suffice to refer to Dr. Hodgkin's works for an elaborate account of the structure and arrangement of the cysts; and to the essays of Dr. Tilt‡ for descriptions of their contents.

The foregoing account of the structure of these cyst-bearing cysts in the ovaries is derived entirely from naked-eye-observations. Respecting the mode of generation of the endogenous cysts, it could only be supposed that they are derived from germs developed in the parent cyst-walls, and thence, as they grow into secondary cysts, projecting into the parent-cavity; or, disparting the mid-layers of the walls, and remaining quite enclosed between them; or, more

* No. 2621.

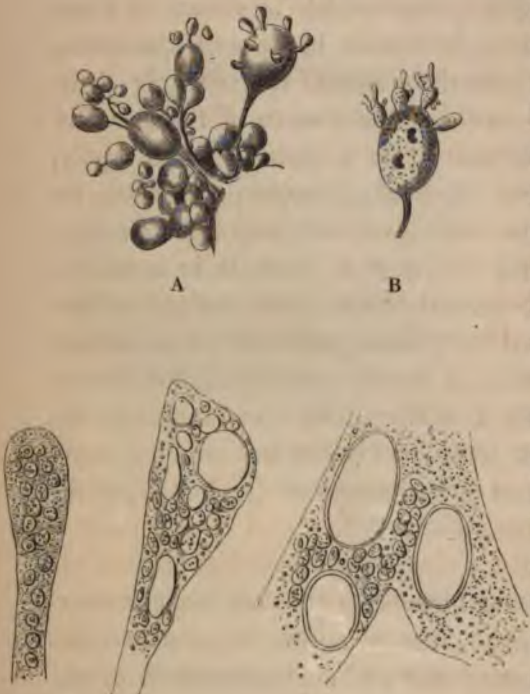
† No. 2622 in the College-Museum presents an instance of the endogenous and exogenous modes of growth in the same specimen.

‡ Lancet, 1849.

rarely, growing outwards, and projecting into the cavity of the peritoneum.

But a more complete illustration of the origin of such secondary cysts, and a good confirmation of what I have been describing, may be drawn from Dr. Mettenheimer's investigations on the microscopic structure of the cystic disease of the chorion.† Some of his illustrations are copied in fig. 6.

Fig. 5.*



A B

C D E

The general characters of this disease, constituting the hydatid mole, are well known. A part, or even the whole, of the chorion is covered with pellucid vesicles with limpid contents, borne on long, slender, and often branching pedicles (A). The cysts are usually oval or pyri-

* Fig 5, cystic disease of the chorion, as described above: A and B natural size; C, D, E, magnified 250 times.

† Müller's Archiv, 1850, H. v. p. 417. His account, though different in interpretation, is consistent, as to facts, with one by Gierse and H. Meckel, in the Verhandl. der Gesellsch. für Geburtshülfe in Berlin, 1847.

form; their walls are clear, or have minute opaque dots (B); they may be simple, or may bear others projecting from their walls.

Dr. Mettenheimer has found that the minute dots besetting these cysts are villous processes, exactly resembling those of the natural chorion, and growing from the walls of the cysts, either outwardly or into their cavities. In these villi he traced the development of cysts. In their natural state the villi may be described as filiform or clavate processes, often branching and bearing bud-like projections, and composed of dimly-granular substance, in which are imbedded minute nucleated cells (C). In this cystic disease, vesicular bodies may be seen (as in D and E) scattered among the cells in the villi, which bodies are distinguished from the cells by their pellucidity, their larger size, and, when largest, by double contours; but, from the cells to these, every gradation may be so traced as to leave scarcely a doubt that the vesicles are derived from cells deviating from their normal characters. Thus, in some of the cells, the contents are seen lighter and less granular; in some they have entirely disappeared, without increase of size; and then, when their contents are thus become uniformly pellucid, and they have acquired the character of vesicles, the cells appear to grow, while their walls become stronger, and they acquire such a size that they are recognized as very small cysts, similar, in all but their size, to those which are visible to the naked eye.

Now, though this method of formation of cysts has been traced by Mettenheimer only in the villi which grow on the cysts themselves, and therefore, so to speak, only in the production of cysts of the second and later generations, yet there can be little doubt that the first cysts in the diseased chorion are formed in its own villi after the same manner. For the villi which are borne on the cysts, and which to the naked eye appear like little dots, are, in all essential characters, like those natural to the chorion; and the cysts of all generations are equally like. The whole process may, therefore, be probably thus described:—Certain of the cells in the proper villi of the chorion, deviating from their cell-form, and increasing disproportionately in size, form cysts, which remain connected by the gradually elongated and hypertrophied tissue of the villi. "On the outer surface of the new-formed cysts, each of which would, as it were, repeat the chorion, and surpass its powers, a new vegetation of villi sprouts out, of the same structure as the proper villi of the chorion. In these begins again a similar development of cysts; and so on *ad infinitum*." Each cyst, as it enlarges, seems to lead to the wasting of the cells around it; and then, moving away from the villus in which it was formed, it draws out the base of the villus, which strengthens itself, and forms the pedicle on which the cyst remains suspended.

Such is the account of the minute structure and formation of the cystic disease of the chorion; and perhaps no instance could afford a better confirmation of the production of cysts by the enormous growth of elementary cells, or a better type of the capacity of cysts thus formed to produce structures resembling those in the abnormities of which themselves originated. A similar capacity is among the characters of all the cysts of which I shall next have to speak.

2. I pass now to the consideration of the cysts that are proliferous with vascular growths from their internal surfaces.*

* It may be well to refer to the fact that abnormal growths upon natural free surfaces commonly affect the same forms, as will be described in the following account of the vascular growths in cysts.

The first group of them may include those that bear glandular growths—the "glandular proliferous cysts," as we may call them, because the minute structure of the substance growing into them is, in its perfect state, exactly comparable with that of a secreting or vascular gland.

Such cysts form part of the group to which the name of "sero-cystic sarcoma" was given by Sir B. C. Brodie, who first clearly distinguished them.* They are also part of those which furnished to Dr. Hodgkin the chief grounds for his well-known theory of the formation of solid tumours—a theory which, in regard to at least these growths, has good foundation.

The chief seats of the formation of glandular proliferous cysts are the mammary and thyroid glands. Their history in the thyroid, in which their formation scarcely passes the bounds of health, is amply illustrated in the often cited

The chief forms are three: namely, 1st, groups of slender, small, and pedunculated bodies; 2d, larger round pendulous masses; 3d, nearly level, slightly elevated layers, such as granulations. Now groups of pedunculated leaf-like processes occur on natural free surfaces; in the growths that are so frequent in chronic rheumatic diseases of joints, from some of which Müller draws his account of *lipoma arborescens;* in certain warty cancerous growths on the skin, which appear like cancerous overgrowths of the papillæ; and in similar growths in the larynx about the vocal cords. Of the larger, round, pedunculated masses, growing on natural free surfaces, instances exist in the medullary cancers of the urinary bladder, the polypi of the intestines and stomach, the pendulous outgrowths of the skin. And of the flatter, and more nearly level layers, the condylomatous outgrowths of skin, the epithelial cancers of the stomach and intestines, and the cheloid growths, often afford examples. There is in all these resemblances a good illustration of the tendency of the growths in cysts to imitate those on natural parts.

* The disease is admirably illustrated by the specimens in the Museum of the College, and in those of St. George's, Guy's, and St. Bartholomew's Hospitals.

works of Frerichs and Rokitansky, to which, as well as to the essay by Mr. Simon* on the natural structure of the gland, I must, for brevity's sake, refer.

A series of preparations,† such as are represented in figs. 6, 7, 8 may clearly illustrate the corresponding process in the mammary gland;‡ but here the conditions are far more remote from the normal type. If we may believe that a series of specimens may be read as the continuous history of one case, because they seem to present successive phases of the same disease, then, we may suppose, first, the existence of a cyst (fig. 6), or of a collection of cysts (fig. 8), in the mammary gland. Such cysts may be formed by the dilatation of parts of ducts; but, much more commonly, the cysts that bear vascular growths are derived through transformation and enormous growth of some elementary structure of the gland.§ So far as I know, there is nothing peculiar in the structure of the mammary cysts that may be proliferous. They are usually ovoid or spherical, unless changed by mutual compression, as in fig. 8: they usually appear formed of thin fibro-cellular tissue, with or without elastic fibres: they have abundant blood-vessels, and are closely adherent to the surrounding parts: their walls are peculiarly apt, in disease, to become œdematous, succulent, and almost gelatinous. They may grow to an enormous size. A specimen is in the Museum of St. George's Hospital, in which a cyst, that would contain more

* Philosophical Transactions, 1844, Part ii.

† Such as those in the College-Museum, Nos. 168 to 172, &c.

‡ All the cases recorded have occurred in the female breast, except two: one by Mr. Arnott; Medical Gazette, xxii. 378: and one by Müller; "On Cancer," p. 180.

§ On the difference between the solid contents of dilated ducts and those of the proper or autogenous cysts, see Mr. Birkett's account in his Essay on the Diseases of the Breast.

than two pints of fluid, has some lowly lobed growths from one portion of its inner surface; one in the College-Museum, removed by Mr. Liston, weighed twelve pounds; and Dr. Warren relates a case in which he removed a tumour of this kind of thirteen pounds weight. The cysts may contain any of the varieties of serous or bloody fluid, clear or turbid, that I described in the last lecture.

FIG. 6.*

Now, from some part of the inner surface of such a cyst, a vascular growth may spring (fig. 6); and, as this gradually increases at a rate beyond that of the increase of the cyst, it fills more and more of the cavity. At length, the growth wholly excludes the fluid contents of the cyst, and its surfaces come in contact with the remainder of the cyst-walls (figs. 7, 8). The growth may now coalesce with the walls of the cyst, and form one solid tumour, enclosed in and connected with them, just as ordinary solid tumours are invested and connected with their fibro-cellular cap-

* Fig. 6, a cyst in a mammary gland, to part of the inner surface of which a vascular growth is attached. Below it a smaller cyst is nearly filled with a similar growth. Mus. St. Bartholomew's: three-fourths of the natural size.

sules. Or, growing yet further and more rapidly, the growth, hitherto intra-cystic, may protrude through its cyst-walls and the superjacent integuments; protruding through them as a hernia of the brain does through the skull, growing exuberantly over the adjacent skin (Fig. 8), and, like such a hernia, reproduced when cut away.

The time in which these changes may be accomplished is extremely various. Usually, the increase of the intra-cystic growth appears to be painless, and it may be very slow: ten years or more may pass with little change; but the increase is generally faster, and it often shows an accele-

Fig. 7.*

rating rate; so that, late in the disease, the progress is extremely quick, even quicker than that of most cancerous growths.

The characters of the intra-cystic mammary growths are various, not only according to our observations of them at

* Fig. 7, a cyst in the mammary gland filled with a vascular growth bearing clusters of pedunculated processes. Mus. Coll. Surg. Natural size.

different periods of their existence, but, apparently, even from their very origin. In looking through a large series of them while they are still in early periods of their development, we may reduce them to these chief forms; namely, low, broad-based, convex layers, like coarse granulations; spheroidal, lobed, and nodulated masses, cauliflower-like, attached by narrower bases (fig. 6); masses or clusters of pedunculated leaf-like processes, slender, single or variously branched, and interlaced in all possible forms (fig. 7); masses of firmer and much paler substance, appearing as if formed of close-packed lobes, or fimbriated processes, or involuted layers (fig. 8).

FIG. 8.*

In apparent structure, also, the varieties of these growths are scarcely less numerous. Some of them are opaque, yellow, and soft, yet elastic, and rather tough, so as to be separable in laminæ like fibrine-clot; others are more vascular, succulent, and spongy, like granulations; others are like layers and masses, or heaped-up layers, of gelatine, not

* Fig. 8, collection of cysts filled with glandular growths in and protruding from the mammary gland: described p. 71. Half the nat. size.

firmer than size, or even like vitreous humour, yielding a tenacious synovia-like fluid: others are firm, compact, nearly pure white, imitating the mammary gland, but not succulent.

To these varieties of appearance we might add yet more, due either to diverse shades of yellow, pink, grey, or purple; or to the various clustering and incomplete fullness of the cysts; or to the increasing firmness of the growths, and their fusion with the cell-walls; or to the development of new barren or proliferous cysts in the solid growths that now fill the cysts of a former generation; or to various changes of decay or disease ensuing in either the cyst-walls or their contents.

It would be too tedious to describe all these varieties, especially while we do not yet know whether, or in what degree, these forms are related to one another, or to any one typical condition of the intra-cystic growths.

Respecting their minute structure, we have good guidance in the probability, which will be supported in the eighth lecture, that the proper mammary glandular tumours—the chronic mammary tumours of Sir A. Cooper— have their origin in intra-cystic growths, transformed into solid tumours in the manner just described. The mammary glandular tumours are composed of minute structures closely imitating those of the gland itself. They present microscopic lobes, and fine tubules, lined or filled with nuclei and nucleated cells, like those of secreting organs; these, inclosed within pellucid membrane, form a pseudo-glandular substance, such as, we might suppose, needs only a main duct to enable it to discharge the office of a mammary gland. In the like manner and degree, in some specimens in which the cysts and their contained growths are still easily separable, we can discern in the growths a likeness to the mammary gland itself in their minute structure.

These facts have been observed especially by Mr. Birkett, and were very well marked in a case which I was recently able to examine, and of which figure 8 represents a section. It was a very large protruding tumour of the breast, removed by Mr. Lawrence from a lady 55 years old. It had been observed for thirty years, remaining like a small knot for twenty-six years, and then slowly increasing, till, at the end of five years, a red fungous mass protruded from the breast, bled freely sometimes, and discharged profusely. This, too, increased quickly, and was painful. The whole breast was removed, and the patient recovered.

The tumour (fig. 8) measured nearly seven inches by five. The part which did not protrude beyond the level of the skin was imbedded in the substance of the gland. It consisted of numerous lobes of various sizes and shapes, and variously divided into smaller lobes; all being evidently formed of distinct cysts closely packed and compressed together. Most of these cysts were filled with intra-cystic growths; yet in many of them it was easy to pass a probe between their walls and the surfaces of their contained growths, which were fixed to only one part of the cyst-walls. In the protruding part, of which the overhanging outer border is shown in the sketch (fig. 8), the same general plan of structure could be discerned, but less distinctly.

Among the solid growths that filled the cysts, some showed clavate, close-packed lobes; some were nearly simple; nearly all were pale, white, greyish or yellowish, and smooth and shining; a few were spotted with yellow, from degeneration of their tissue. Repeated examinations showed that all these consisted essentially of a tissue imitating that of a gland, and such as will be described in the ninth lecture. The edges and surfaces of the examined portions were minutely lobed or acinous, like terminations of gland-tubes. These were inclosed by well-defined, pellucid membrane; and their cavities were full of nuclei and nucleated cells, like mammary gland-cells, with some granular matter. Except in that these acini led to no distinct ducts, but seemed confusedly heaped together, the imitation of gland-structure was complete.

Now, the glandular nature of these growths in the best-marked cases of proliferous mammary cysts, and the probably constant relation of the mammary glandular tumours to them, as well as the analogy of the intra-cystic thyroid growths, may seem to make it probable that, in all cases, the growths within the mammary cysts are of essentially the same glandular nature, and that their various appearances are due to their being in rudimental, or degenerate, or diseased states. But we cannot be sure of this. In three cases, in which I have minutely examined soft intra-cystic growths, I could not recognise a glandular structure. In all, I found a basis-substance, which was pellucid, soft, and in one case diffluent; it had little or no appearance of fibrous structure, and no distinct fibres, but, rather, presented the uniformity as well as the consistence of soft gelatine. In it, as in a blastema, were imbedded nuclei and cells, which chiefly presented the forms of developing fibro-cellular tissue, like those in granulations, or of inflammatory lymph: or their forms might be explained, I think, by the disorderly conditions of their production and development. Nearly similar, and equally indecisive results appear from an accurate observation of such a growth by Dr. Mettenheimer,* and from two cases related by Bruch.†

Perhaps we may conclude that, in these specimens, the intra-cystic growths were in a rudimental, or in a morbid

* Müller's Archiv, 1850, p. 207.

† Die Diagnose der bösartigen Geschwülste, p. 185, 191.

state; that the general destiny of such growths is towards a glandular structure, but that in these and the like instances they fell short of it, or swerved from the right course. But I would rather not form any conclusion at present. These are just the cases of which, as yet, the interpretation is scarcely possible, while we are ignorant of the changes that may ensue during development, degeneration, and disease.

I have said that the mammary and thyroid glands might be regarded as the elected seats for cysts having glandular growths; but they are sometimes met with in other parts, as in the prostate, and, I believe, also in the lip. In the Museum at St. George's Hospital is a tumour removed from a man's upper lip, in which it had been growing, without pain, for 8½ years. One half of it is a cyst that was filled with a thin flaky fluid, and was thought to be a dilated labial gland-duct; the other half is a solid tumour, just like a glandular tumour of the lip which I shall describe in a future lecture. I have lately seen another case with nearly the same characters: and the combination of a barren cyst with a proliferous one, which they seem to illustrate, is not rare in the mammary gland. In the same Museum is a cyst, with a broad vascular growth, like granulations, from its walls, which was taken from a girl's labium by Mr. Cutler. It has a small external opening, suggesting that it may have had its origin in a cystic mucous or sebaceous gland.* In the College-Museum, No. 167, is a thick-walled cyst, from the cheek of an old woman, which contains two large, lobed, and pedunculated

* See also an account of a specimen in the same Museum, by Mr. Hawkins: Medical Gazette, xxi. p. 951; and Proc. of Pathol. Soc. ii. p. 340. I suppose there is some relation between these and the sub-

masses, so like some of those found in the mammary cysts that we can hardly doubt their glandular nature.

All these specimens, however, need more minute examination; at present they only make it probable that any cyst originating in or near a secreting gland may be the parent, or the habitation, of an endogenous glandular growth.

To this account of glanduliferous cysts it must be added, that their characters may be closely imitated by cysts formed in parts altogether unconnected with secreting glands. It is not, indeed, probable that the contained growths in such cysts are glandular; yet they present characters like the softer growths that are found in the mammary cysts.

I found one of these proliferous cysts beneath the gracilis and adductor longus muscles of a woman 25 years old. It was a large spheroidal mass, which felt as if held down tightly on the front of the pelvis, and had pushed the femoral vessels a little outwards. It lay too deep to form a clear diagnosis of its nature; it was assigned to no distinct cause; it had been noticed for only seven months, but when first seen was "as large as a tea-cup." I removed it without much difficulty; for it was not closely adherent to the parts, except to a small portion of the front of the pubes, where it rested on the adductor brevis. The patient has since remained well for more than three years.

The tumour was spheroidal, about four inches in diameter, and consisted chiefly of cysts, from two of which six or eight ounces of turbid serous fluid escaped when

cutaneous warts and condylomata described by Hauck and Krämer; but I have not seen what they refer to. (See Simon: Hautkrankheiten, p. 225.)

they were cut across. One of these cysts was thickly lined with pale, brownish, fibrinous substance, like that which one finds in old hæmatoceles; and this appeared as fibrine on minute examination. Another was nearly filled with a ruddy mass, in most parts soft and succulent, like blood-stained gelatine. Much of this mass was also like fibrine-clot, with abundant corpuscles; but the layers of it next the cyst-walls were firmer than the central parts, and contained all the forms that one finds in common granulations developing into fibro-cellular tissue. The microscopic likeness to granulations was, in these parts, exact. The rest of the tumour, including some large portions between the cysts, consisted of fibro-cellular tissue more or less perfectly developed.*

A similar tumour was removed by Mr. Lawrence from the exactly corresponding part of a woman, 50 years old, in whom it had grown slowly, and without pain, for nine or ten years. It gave the sensation of a firm fatty tumour, as large as an egg, but when removed was found to be a bilocular cyst. Each cavity contained, together with serous fluid, a soft, reddish, gelatinous-looking mass, like a polypus in one, and solid and folded in the other. The cyst-walls were tough, pure white, formed of fibro-cellular tissue, and polished on their inner surface. The intra-cystic growths consisted of a structureless or dimly granular or fibrillating blastema, with abundant oily molecules, granule-cells, and corpuscles, like nuclei or cytoblasts, imbedded in it.

And to these two instances, since the disease seems very rare, I may add a third. A girl, twenty-three years old, under the care of Mr Lawrence, had a pyriform pendulous tumour in her neck, about 2½ inches long. Its surface

* The tumour is in the Museum of St. Bartholomew's Hospital.

was ulcerated, livid, and painful, and bled occasionally. Its history was doubtful; but it had existed for at least a year. On removal, it appeared to have grown in the subcutaneous tissue, and to be composed of a collection of cysts, closely and irregularly packed, and, for the most part, filled with lobed, soft, cauliflower-like growths from parts of their walls. It closely resembled, in its general aspect, the collections of proliferous cysts, with soft intra-cystic growths, in the mammary gland. In microscopic structure the intra-cystic growths appeared composed entirely of corpuscles, like those of lymph or granulations: but my record of the examination, made several years ago, is too incomplete for a clear account of them.

I believe that all the cysts that I spoke of, before these that contain vascular growths, may be regarded as completely void of the characters of malignant disease; at least, I have met with no evidence contrary to this statement, except in certain cases of proliferous ovarian cysts, to which I shall presently refer. And, in general, the reputation of innocency is deserved by the glanduliferous cysts also. Yet there are cases which show that such tumours may have an exceeding tendency to recur after removal.

A healthy robust woman, 37 years old, was under Mr. Lawrence's care with a very large protruding tumour in her right breast. This had been slowly increasing for ten years, but, till lately, had given little uneasiness, except by its bulk, and had not hindered her nursing. Mr. Lawrence removed the greater part of the breast and the tumour in 1844. It weighed 7½ pounds, and was a well-marked example of that form of "sero-cystic sarcoma," in which the cyst-walls, as if altered by inflammation, or imperfectly formed, are soft, succulent, and glistening, with solid growths of similar subtance, lobed and fissured. Many cysts in it still contained serous fluid. Its appearance when recent, and even now as preserved,* leaves no room for doubt as to its nature.

The patient remained well for fifteen months; then a tumour began to grow under the scar, and quickly increased. After nine months' growth Mr. Lawrence removed this also, with all the surrounding tissues. It was a pale, pinkish, and yellowish mass, like soft size or jelly. It was lobed and folded, and included some irregular spaces, containing a fluid like mucus or half-melted jelly. It was like the solid parts of the tumour last removed, and consisted of a pellucid dimly fibrillated blastema or basis-substance, in which were imbedded nuclei and abundant granule-cells, of various forms. The sketches and account of these, which I drew at the time, make me still sure that they had none of the characters of cancer-cells, but were like nuclei or cyto-blasts of ordinary form, or elongated, many of which were changed by fatty or granular degeneration.

After this second operation, the patient remained well for seven months, and fully regained her stout robust appearance. But now a third tumour appeared; a fourth soon after; and both grew rapidly, till, after two months, Mr. Lawrence removed them, and all the parts bounding them. They were, in every respect, exactly like those removed in the last operation, and near them lay another not discerned before the removal. Erysipelas following this operation proved fatal, and no post-mortem examination could be obtained.

Now in the first of these operations some portion of the mammary gland was left. It is possible that some cysts already existed in this portion, and were subsequently developed into the second tumour, which, therefore, might not deserve to be called a recurring tumour, although,

* In the Museum of St. Bartholomew's, Ser. 34, Nos. 19 and 20.

indeed, it appeared under the scar of the former operation, and not in the place where gland was left. But, after the second operation, there is little probability that any gland remained; and we may, with as little doubt, regard the third tumour as an instance of recurrence or repetition; *i. e.*, of reappearance of the disease in an entirely new growth.

Sir B. C. Brodie* has related two cases of single recurrence of tumours very closely resembling that just now described; and the liability to recurrence which Mr. Lawrence's case presented is surpassed by one recorded by M. Lesauvages,† whose description of the tumours he removed accords so closely with what was observed in the foregoing case, that I can have very little doubt they were of the same nature. The patient was 63 years old. The first tumour of the breast, which was of great size, was removed in February 1832; a second appeared, and was removed before the healing of the first wound; a third in May; a fourth in September of the same year; a fifth sprang up, and was removed in February 1833; a sixth in May; in a seventh operation, in June of the same year, three tumours were removed; but from the same spot two more arose, and these grew rapidly, and the patient died.

Now, if, as I believe, all these cases were examples of the proliferous cystic disease of the breast, they prove such an inveterate tendency to recurrence in this disease, as is scarcely surpassed by any even of the well-marked malignant tumours. Unfortunately, no examination of either case was made after death; so that it is not possible to say whether the more characteristic features of malignant disease existed, such as the concurrence of similar disease in

* Lectures on Pathology and Surgery, p. 145.

† Archives Gén. de Médecine, Février 1844, p. 186.

internal organs. The same defect does not exist in a most remarkable case related by Dr. Cooke.* The patient was about 40 years old when, in April 1847, six ounces of a glairy brown fluid were drawn from a cyst in her breast, which formed part of a large tumour that had been growing for seven months, and felt in some parts firm, in others soft and fluctuating. Occasional tappings were subsequently employed; but after five or six weeks the integuments inflamed and sloughed over the cyst, and a profuse discharge of similar glairy fluid ensued. "Fungoid masses" soon protruded, and in July 1847 Dr. Cooke removed the whole disease. It weighed 3½ pounds, and consisted of fungoid masses of various degrees of firmness, with a central cavity lined by a vascular membrane. In December of the same year, a small enlargement on the scar was removed. In March and in October of the next year (1848), renewed growths were again removed. In 1849, the disease again returned, and was extirpated in June 1850. This was "a miniature representation of the tumour removed at first:" and it was examined by Mr. Birkett, who reported of it, that, "in a stroma of fibrous tissue cysts appeared, containing a yellow tenacious fluid. The follicular terminations of ducts of glands were very distinctly seen in the fibrous tissue, and nucleated corpuscles: within these follicles were clearly seen the elements of the epithelium of glands." The patient recovered rapidly from this last operation, and no recurrence of the disease in the breast again ensued; but in June 1851 she began to suffer with what proved to be cancer of the peritoneum, liver, pleura, pelvic organs, and lumbar and thoracic lymphatic glands. When she died, in November 1851, abundant cancerous

* Medical Times and Gazette, August 7, 1852.

disease was found in all these parts: but the seat of former disease in the breast was healthy, and, as Mr. Birkett especially remarks, all the lymphatic glands connected with the breast were, as they always had been, unaffected, while all those connected with the cancerous parts in the pelvis and elsewhere were the seats of cancer.

The fact last mentioned makes it improbable that the cancerous disease with which this patient died was continuous with, or a part of, the disease which had been manifested in the breast. Rather, we may believe that the two affections were essentially distinct, and that the first was, like the others I have related, an example of recurring proliferous cystic disease. But further inquiries are necessary to elucidate these cases; at present, they are obscure in all but their practical import, and in their proof that the cystic disease of the breast, though generally a completely innocent disease, is, in certain cases, peculiarly prone to recur after removal. Such inquiries, I may add, would be likely to obtain knowledge on several important but unsettled points in relation to the whole class of tumours; such as (1) whether any, and what, tumours may be regarded as transitional, or intermediate, between the innocent and the malignant; (2) whether tumours which, though having the general characters of innocent tumours, are yet apt to recur, may not, in their successive recurrences, assume more and more of both the structure and other properties of cancers; (3) whether tumours, like such as are generally innocent, are not peculiarly prone thus to recur in persons who are members of cancerous families; (4) whether there is not a peculiarly near affinity between some forms of these proliferous cysts, and the alveolar or gelatiniform cancer. Such an affinity is made probable by some of the diseases of the ovary. In some of these, it is difficult to decide to which of the two affections they should be referred: in some, what seems to be a complex cystic disease of the ovary is coincident with medullary cancer of the same or other parts;* and in some, medullary or alveolar cancer seems to be developed in the interior of portions of the complex cysts. I shall consider these questions more fully in the lectures on the general pathology of cancers.

3. It may be inserted here, that the mode of growth observed in the glandular proliferous cysts may be imitated by genuine cancerous diseases.

Cancerous growths may be found in cysts under at least two conditions; namely, in cysts that of themselves appear innocent, and in cysts produced within cancers.

Of the former mode of growth we have the examples in ovarian cysts, to which I just referred; and herein are, perhaps, the only unexceptionable instances of the transformation of an innocent into a malignant tumour.

The second mode of production of intra-cystic cancers is best shown in some examples of medullary tumours of the testicle. In these† we may see a repetition, so far as the plan is concerned, of the intra-cystic production of thyroid gland. The great mass of the medullary disease includes smaller masses, incapsuled with fibro-cellular tissue, and commonly presenting a lobed and laminated form, at once reminding us of the intra-cystic glandular growths, and justifying the application to them of the principles of Dr. Hodgkin's theory of the growth of cancers.

In these medullary testicles the intra-cystic medullary growths have usually filled the cysts and coalesced with their walls. In rare cases one can discern how the growths

* This was the case in the patient whose history was last mentioned, and the same fact has been frequently observed.

† As in Mus. Coll. Surg., No. 2396.

spring up as spheroidal, or as pedunculated, branching, and grouped processes from the interior of the cysts. This condition was peculiarly well shown in a case of cancer of the clitoris, in which the whole of that organ was occupied or concealed by a cancerous mass inclosing several distinctly walled cysts, which were half-filled with small, soft, and lobed cancerous intra-cystic growths.*

4. I proceed to the consideration of the *cutaneous proliferous cysts; i. e.* of cysts within which, in the typical examples, a tissue grows, having more or less the structure and the productive properties of the skin.

* Museum of St. Bartholomew's, Ser. xxxii. 39. Rokitansky gives to cases of this kind the name of cysto-carcinoma, and draws a just parallel between them and the instances of cysto-sarcoma. (Pathol. Anat. i. p. 390). Cysto-sarcoma he regards, nearly following Müller herein, as a combination of sarcoma with cyst-formation. The cases included by him and Müller (On Cancer, p. 170) under the name, cannot be all enclosed in the groups which I have brought near together. (1.) Some are cases in which simple cysts are found within solid tumours: these are named Cysto-sarcoma simplex, and such as these will be mentioned or referred to as varieties of fatty, fibrous, fibro-plastic, and cartilaginous tumours, in all of which the formation of cysts may ensue. (2.) The Cysto-sarcoma proliferum, if it be correctly described as constructed of cysts contained in a solid tumour, and *containing younger cysts* in their interior, I have never seen. The case to which Müller refers as exemplifying it, and which is figured by Sir A. Cooper (Illustrations, p. 41, pl. iii.) was, I believe, an instance of proliferous glandular cyst in the mammary gland. (3.) The Cysto-sarcoma phyllodes is a proliferous glandular cyst of the breast, and is especially exemplified by the cases in which the intra-cystic growths are firm, lobed, pedunculated, and clustered, and in which many cysts are close-set in the breast. But in this disease there is, I think, no solid tumour in which the cysts are set: they appear to be themselves the primary disease, the solid growths within them being secondary formations; and if this be true, they cannot properly be grouped with the examples of Müller's Cysto-sarcoma simplex.

Instances of these in a perfect or typical state are rare. In the large majority of cases the cutaneous structure, if it were ever present, has degenerated or disappeared; and we recognize the relations and import of the cysts only through their containing epidermal and sebaceous materials, of which the natural production is a peculiar attribute of the tissues of the skin.

Among the parts in which these skin-bearing cysts may be found are some that have no natural connection with the skin.

1. They are frequent in the ovaries; one or more Graafian vesicles enlarge and grow, and then, apparently, produce on their inner surface a growth of skin, with its layer of cutis, subcutaneous fat, epidermis, and all the minute appended organs of the proper hairy integument of the body. The general likeness of the interior of these cysts to ordinary skin had been often noticed; but the first minute demonstration of it was by Kohlrausch,* whose observations have been fully confirmed by others as well as by myself. Among the specimens in the College-Museum, one (No. 164 A) presents all the textures of a hairy piece of skin growing on the interior of one of the cavities of a large multilocular ovarian cyst. Of the other divisions of the same cyst, some contained fatty matter and loose hair; others, various fluids; others, secondary and tertiary cysts: and this is commonly the case. Another specimen in the College-Museum (No. 2624) shows very well the origin of these skin-bearing cysts. It is an ovary, with a cyst, the small size of which, as well as the structure of its walls, and the mode in which they are connected with the surrounding substance of the ovary, leaves no doubt that it is a simply enlarged Graafian vesicle. Yet

* Müller's Archiv, 1843, p. 365.

it contains some hairs, and a small mass of fat, resembling the subcutaneous fat, with its tough fibro-cellular partitions.

2. Cutaneous proliferous cysts may form in the subcuaneous tissue. They are, indeed, rare in this tissue in man, except in cases of congenital growths. In the little cysts about the brow, or in or near the orbit, the inner surface is often perfectly cutaneous; and Lebert* has detected in such cysts all the minute structures and organs of the skin. Most of these cysts are first observed at or soon after birth. Some similar specimens of cysts lined with skin are in the Museum of the College.† These were taken from the subcutaneous tissue of a cow and of an ox; and, in some of them, the inner surface of the cyst could hardly be distinguished from the outer hairy integument of the animal.

3. Besides these, the common seats of cutaneous cysts, perhaps any part or organ may in rare instances present them; for the records of surgery and pathology would furnish abundant instances of aberrant cysts containing hair and fatty matter, such as we must class with these in which the cutaneous structure and products are more perfect. The most singular and frequent of these rarer examples are in the testicle,‡ the lung,§ the kidney,‖ the bladder;¶ and under the tongue,** and within the skull or brain. Those in the brain are of chief interest. I found one†† many years

* Abhandlungen, p. 99, e. s. The structure is well shown in No. 158 in the College-Museum.

† Nos. 161, 163, &c.

‡ See Goodsir, in Edinb. Monthly Journal, June 1845.

§ Kölliker, in the Zeitschrift für wissensch. Zoologie, B. ii. p. 281.

‖ Mus. Coll. Surg. 1904.

¶ Mus. Coll. Surg. 2626.

** Schuh, Pseudoplasmen, p. 154; and Mus. St. Bartholomew's, Ser. xxxv. No. 25.

†† Mus. St. Bartholomew's, Ser. vi. 56.

ago in an elderly man. While he was in St. Bartholomew's Hospital with an ulcerated leg, he suddenly died; and the only probable cause of death appeared to be a mass of granular fatty matter mixed with short stiff hairs, which lay in the tissue of the pia mater under the cerebellum.

A yet more remarkable case is in the Museum of St. George's Hospital, in Mr. Cæsar Hawkins's collection. It exhibits a mass of fatty matter, and a lock of dark hair 1½ or 2 inches long, attached to the inner surface of the dura mater at the torcular Herophili. This was found in a child two and a half years old, in whom it appeared to have been congenital.

It is perhaps only during the vigour of the formative forces in the fœtal or earliest extra-uterine periods of life, that cysts thus highly organized and productive are ever formed. The *sebaceous, epidermal,* or *cuticular* cysts that grow in later life are imperfect, impotent imitations of these; yet clearly are the same disease, and are, therefore, most naturally classed with the proliferous cysts, needing only to be named according to their contents. We cannot tell, in any advanced case of such a cyst, whether the more complicate structures of the skin ever existed; if they did, they have degenerated before the cyst became of distinct size; yet the retained likeness is sometimes shown in the fact that, when such cysts are laid open to the air, they do not granulate, but assume for their internal surfaces the characters of the adjacent and now continuous skin.*

Of these sebaceous or epidermal cysts it is interesting to notice the frequent hereditary origin. Perhaps, in the majority of cases, the bearers of these have known one or

* See Home, Hunter's Works, vol. iii. p. 635; and a remarkable case by Mr. Green, in the Medical Gazette, vol. ii. p. 346.

more members of their family similarly endowed. They are certainly more commonly hereditary than are any forms of cancer.

I have already referred to the double mode of origin of the epidermal cysts. Sir Astley Cooper first observed that some among them could be emptied, by pressing their contents through a small aperture in the cutis over them, and hence concluded that they are all examples of hair-follicles distended with their secretions, and overgrown: but probably this conclusion is true for only a minority of these cysts. They are, I think, comparatively few in which an aperture can be found;* the greater part are closed on all sides alike, and must be regarded as cysts new-formed.

The characters of these epidermal cysts may be extremely various, in regard not only to their walls, but to their contents. Their walls may be thin, delicate, and pliant; or laminated, thick, and hard, with tough fibrous tissue; or they may be calcified; and I believe a general rule may be connected with the differences in these, as in other cysts, namely, that the thin-walled are the most productive, grow most rapidly, and are the seats of most active change.

Among the contents of these cysts we may observe extreme varieties. The chief alone need be referred to. And 1st, we find successive productions of epidermis, formed in layers on the inner wall of the cyst, and thence successively shed, and pushed inwards towards its centre. A section of such cysts (which were particularly described by Sir Everard Home from the Hunterian specimens) presents layers of white soft epidermis, like maccrated epidermis of the heel or palm. The external layers are commonly quite regular,

* Mr. South especially notices this in his edition of Chelius's Surgery, vol. ii. p. 698. See also Walther, in Vogel's Pathol. Anat. p. 224.

white, and flaky; but the internal are more disorderly, as if broken-up and mingled with less organized productions.

2dly. A peculiar appearance is given to contents like these, where, among the layers of epidermal scales, abundant crystals of cholestearine are mingled. They hence derive an appearance like that of the masses to which Müller* has given the name of cholesteatoma, or laminated fatty tumour; and, indeed, the few well-marked examples of this disease which I have been able to examine, as well as Müller's own account, make me think that what he named cholesteatoma is only a combination of layers of epidermal scales with crystals of cholestearine.†

The appearance produced by such a combination is quite peculiar. It forms nodular masses of soft and brittle substance, like wax or spermaceti, the surfaces of which present a bright glistening, like that of mother-of-pearl, while their sections are finely laminated. It is a rare disease; the most frequent seats of well-marked specimens appearing to be in ovarian cysts, and in connection with the membranes of the brain. The characters are well shown in the contents of a small ovarian cyst in St. Bartholomew's Hospital; and in the tumour within the occipital part of the cranium, in Mr. Hawkins's collection, to which I have already referred. Striking examples are figured by Cruveilhier;‡ but the want of microscopic examination leaves their constitution uncertain.

3dly. In the opposite extreme to these cysts, in which the cuticular product is most perfect, we find an innumerable variety of contents, of buff- and ochre-yellow, and

* On Cancer, p. 155.

† See, also, an account of such a case by Mr. W. Adams, in Proc. of Pathol. Soc. 1850-1. Other writers since Müller have applied the name of cholesteatoma more vaguely.

‡ Anatomie Pathol. liv. ii. p. 6.

brownish materials, that seem to consist mainly of degenerate cuticle mingled with sebaceous secretions. The microscope finds in them a confused mass of withered scales, of granular fatty matter, clustered and floating free, of cholestearine-crystals, and of earthy matter in free molecules, or enclosed within the cells or scales. And all these may be floating in a turbid liquid, or retained in some soft tenacious mass, or clustered in hard nodular and pointed masses, projecting like stalactites from the old cyst-walls.*

One more phase of this disease deserves especial notice—that in which the cyst ulcerates, and its contents protrude. An inflammation in or about the sac often appears the inducement to this change; and sometimes the inflammation itself can be traced to nothing but disturbance of the general health. The probability that it may thus arise makes the caution very valuable which Mr. Humphry† gives concerning the removal of all tumours. "It is always well" (he says) "to bear in mind that persons are most likely to consult us respecting these, or other growths of the like kind, when they are out of health, and consequently unfit to bear an operation: they do so because the tumour is then most productive of pain and annoyance."

A distressing instance of the truth of this occurred to myself five years ago. A strong but very intemperate man came to me as an out-patient, with an ulcerated sebaceous cyst, about three-quarters of an inch in diameter, just below and to the right of the umbilicus. He had observed a tumour here for 16 years; but he had scarcely thought of it till, during the last five weeks, it had grown

* College Museum, 157 A and 2297. A most remarkable specimen is in the Museum of Guy's Hospital, which was removed from an old man's thigh.

† Lectures on Surgery, p. 135; from the Provincial Medical and Surgical Journal.

quickly, and in the last fortnight had ulcerated. I saw no reason to be very cautious in such a case; so slit the tumour and removed it, as well as the thickening and adhesion of the parts around would allow. In the evening, having returned to his work and some intemperance, hæmorrhage ensued from a small cutaneous vessel, and before he reached the hospital he lost more than a pint of blood. I tied the artery, and applied solution of alum to the rest of the wound, for its whole surface was oozing blood, and he was admitted into the hospital. The next day he became very feverish, and he appeared as if he were going to have typhus, which was then prevalent. But from this state he partially recovered; and then abscesses formed in his groins, and discharged profusely. Nothing improved his health, and three months after the operation he died, apparently exhausted by the continual discharge from the abscesses, and with both external epigastric veins and parts of the femoral veins full of old clotted blood—the consequence of slow phlebitis.

Cases like this, or ending fatally much sooner than this did, with erysipelas or more acute phlebitis, have occurred to many surgeons. They need no comment to make them instructive.

I believe the contents thus protruded from cutaneous cysts may become vascular. I have not seen this event, but it seemed certain in a case observed by Mr. James Reid. A woman, 80 years old, had numerous cysts in her scalp. They were like common sebaceous cysts, and three of her daughters had cysts like them. Two years and a half before her death, one of the cysts, which had not previously appeared different from the rest, inflamed. It was opened, and sebaceous matter was discharged from it. The opening did not heal, but ulcerated, and a small hard lump remained under the ulcer for a year, when, after erysipelas of the head, it began to grow, and rather quickly increased to a mass nearly five inches in diameter, which occasionally bled largely. The mass has the appearance of the firm contents of a cuticular and sebaceous cyst, and contains abundant epidermal cells;* so that there can be scarcely a doubt that it had its origin in the contents of such a cyst.

5. Concerning cysts containing teeth, a few words must suffice. They are of two kinds. Some, occurring in the ovaries, and more rarely in other parts, bear, with one or more teeth, the products of skin, as hair, epidermis, &c.† These may be regarded as diseases of the same general group with the cutaneous proliferous cysts; and the great formative power which they manifest is consistent with their occurring only in embryonic or fœtal life, and in the ovaries, in which, even independently of impregnation, one discovers so many signs of great capacity of development.

Other dentigerous cysts occur within the jaws. In some cases, cysts are hollowed out in the substance of the upper

* Museum of St. Bartholomew's Hospital, Series xxxv. No. 57. Probably the case was similar which is related by Mr. Abernethy in his Essay on Tumours, p. 117. Such cases have peculiar interest in relation to the question of the possible origin of certain epithelial cancers in these cysts. This will be referred to in Lecture XII.

† A very remarkable specimen is in the Museum of St. Bartholomew's Hospital (Malformations, A 177). It was presented by Mr. Kingdon, and is described by Dr. Gordon in the Med.-Chir. Trans. vol. xiii. In the anterior mediastinum of a woman twenty-one years old, a tumour, probably of congenital origin, contained portions of skin and fat, serous fluid, and sebaceous matter, and two pieces of bone like parts of upper jaws, in which seven well-formed teeth were imbedded. In an ovarian tumour, more than 300 teeth were once found: in another case, a piece of bone, like part of an upper jaw, with 44 teeth. See Lang, in the essay cited below, p. 11.

or lower jaw, and are lined with a distinct membrane, to some part of which a tooth is attached. I believe these are examples of tooth-capsules, from which the teeth, though perfectly formed, at least in their crowns, are not extruded, and which therefore remain, becoming filled with fluid, and growing larger.* In other cases, that which appears as a cyst is the antrum, distended with fluid, and having a tooth imbedded in some part of its wall, and projecting into its cavity.† In the most remarkable case of the kind, Professor Baum removed a tooth from each antrum of a woman 38 years old. The distension of the antra, with excessive thickening of their lining membranes, and thinning of their osseous walls, and with accumulations of purulent fluid, had been in progress for thirty years, and produced horrible deformity of the face. The operation was completely curative.

* Two such cases are in the Museum of St. Bartholomew's, Series i. 119, 119 A. I saw a third cured by Mr. Wormald by cutting away part of the cyst, and removing the tooth.

† The principal cases are collected in two essays for which I have to thank Professor Baum: namely, Lang, Ueber das Vorkommen von Zähnen im Sinus maxillare; Tübingen, 1844; and Glasewald, De Tumore quodam utriusque Antri Highmori; Gryphiæ, 1844.

LECTURE IV.

FATTY AND FIBRO-CELLULAR TUMOURS: PAINFUL SUB-CUTANEOUS TUMOURS.

Among the solid tumours, the first that may be considered is the fatty or adipose tumour, the Lipoma of some, the Steatoma of others; the most simple in its texture, the most like the natural parts, the least liable to variations; a morbid growth so well known, that I can scarcely hope to impart any interest to an account of it.

Among the growths commonly included as fatty tumours, we find examples of both the forms of morbid hypertrophies of which I spoke in the first lecture. There are both continuous and discontinuous morbid hypertrophies of fat; both fatty outgrowths and fatty tumours, more properly so called.*

The *Fatty Outgrowth* is thus described by Sir B. C. Brodie, in his well-known lecture upon fatty tumours. He says,—"there is no distinct boundary to it, and you cannot say where the natural adipose structure ends, and the morbid growth begins. . . . . These tumours feel like fat, but they may be distinguished from common fatty tumours by their having no well-defined boundary, and by

* M. Lebert (Abhandlungen, p. 112) distinguishes the fatty tumours, according to their degrees of isolation, as Lipoma circumscriptum and L. diffusum. A diagram illustrating the general differences of the two modes of growth is given in the fifth lecture.

their being less soft and elastic. Such deposits may take place in any part of the body; but I have seen them more frequently in the neck than any where else."* Doubtless the case will be familiar to you by which Sir B. Brodie illustrates this account,—the case of a footman, with an enormous double chin, and a great mass of fat extending from ear to ear, who was cured by the *liquor potassæ.* The case already cited from Schuh's essay, (p. 5), was of the same kind.

I can add nothing to this account, except the mention of a singular case of fatty growth connected with the heart of a sheep.† The right ventricle is nearly filled with a lobulated mass of fat, distending it, and pressing back the tricuspid valve. The left auricle and ventricle are similarly nearly filled with fatty growths, and fat is accumulated on the exterior of the heart, adding altogether about twenty-five ounces to its weight. The textures of the heart itself appear healthy, though it is the seat of all these fatty growths.

The discontinuous *Fatty Tumours,* of which alone I shall now speak, present a tissue exactly or very nearly resembling the normal fatty or adipose tissue of the animal in which they grow. Certain differences may, indeed, be sometimes found between the fat of a tumour and that of the part in which it lies; such as the larger size of the tumour's cells, its less or greater firmness at the same temperature, and the usual crystallizing of the margarine; but I believe there are no greater differences than may be found in the natural fat of different parts of the same person.

It would be superfluous to describe or delineate the minute characters of this well-known tissue: it is only in its

* Lectures on Pathology and Surgery, p. 275.

† Mus. Coll. Surg., 1529.

arrangement that the tumours have any peculiarity worth notice. It is, in all, composed essentially of clustered oil-cells; but these are, in some tumours, placed in an uniform mass, smooth on its surface, and only obscurely partitioned; in others, arranged in oval or pyriform lobes, projecting on the surface, easily separable by splitting their fibro-cellular partitions; and in some of these it may be dissected into thin layers, which are wrapped in each lobe, one within the other, like the leaflets of a bud. Moreover, any of these forms, whether "simple," or "lobed," or "involuted," may be either deeply imbedded in the tissues, or "pendulous."

Fatty tumours are, I believe, always invested with a capsule or covering of fibro-cellular tissue; and of these capsules, since they exist with most of the innocent tumours, I may speak now once for all. The capsule, then, of such a tumour is usually a layer of fibro-cellular, areolar, or connective tissue, well organised, dry, and containing blood-vessels proportioned to the size of the tumour. It appears to be formed of the fibro-cellular tissue of the part in which the tumour grows, increased, and often strengthened, in adaptation to the bulk and other conditions of what it encloses. It grows with the tumour, invests it, and at once connects it with the adjacent tissues, and separates it from them; just as, *e. g.*, similar fibro-cellular tissue does each muscle in a limb. Its adhesion to both the tumour and the parts around it is more intimate than that of its layers or portions to one another; so that when such a tumour is cut-into, it may be dislodged by splitting its capsule, and leaving some of it on the tumour, and some in the cavity from which the tumour is extracted. This, at least, can be easily done unless the tumour has been the seat of inflammation, which may thicken the capsule and make all its parts adherent to one another, and to the tissues on either side of it. As Schuh observes, when a fatty tumour is just under the skin its capsule is usually more closely connected with the skin in the interspaces between the lobes than in any other part, so that the skin appears dimpled over it, especially if one squeezes the tumour at its base, and presses it up to make the skin tense.

In the capsule, the blood-vessels that supply the tumour usually first ramify. One principal artery, indeed, commonly passes straightway into the tumour at its deepest part, but the rest branch in the capsule, especially in any thicker parts of it that lie in the spaces between projecting lobes of the tumour. Hence, with the partitions of the tumour that are derived from the capsule, the blood-vessels pass into its substance.

The capsules of these fatty tumours may vary somewhat in thickness and toughness; and so may the partitions that proceed from them into the mass. They are usually very delicate; but they are sometimes thick and strong, and give a density and toughness which approach to the characters of a fibrous tumour. To such examples of fatty tumours deviating from the common type, Müller* has assigned the name of Lipoma mixtum; and Vogel,† Gluge,‡ Rokitansky,§ and some others, call them "Steatoma," and "lardaceous tumour" (Speckgeschwülst).||

Fatty tumours usually occur singly; but there are many exceptions to this rule. Two or three in the same person

* On Cancer, p. 153.

† Pathologische Anatomie, p. 179.

‡ Pathologische Anatomie.

§ Pathologische Anatomie, B. i. p. 283.

|| Müller also gives the name of Lipoma arborescens to the pendulous fatty processes with synovial membrane that are clustered about chronic diseased joints. Sir B. C. Brodie (Lectures, l. c.) describes a form of fatty tumour, which I have not yet seen, in which the tumour is covered with a double layer of membrane, like a serous sac.

are not rarely seen, and a hundred or more may exist. Sir B. C. Brodie mentions such cases; and I am acquainted with a gentleman, who has borne, for nearly twenty years, firm tumours, feeling like fatty masses, in the subcutaneous tissue of his trunk and all his limbs. They are usually stationary, but sometimes one grows a little, or one diminishes, or a new one appears. Lately, I have seen a woman, 50 years old, in whom a large number of similar tumours had been growing for about ten years in the subcutaneous tissue of the arms, thighs, and haunches. They were all small and firm, and felt like tumours of mixed fatty and tough cellular tissue.

The most frequent seats of fatty tumours are the trunk, and the parts of the neck and limbs that are nearest to it; but they may occur in any part where fat naturally exists, and they are not limited even to these.* It is, perhaps, impossible to say why they should affect one locality of fat rather than another. Their rarity in the human mesentery and omentum, and the fat about the internal organs, is remarkable. I have never seen one in the recent state in any of these parts; and I know only two or three specimens in museums.† In the College-Museum (No. 194) is a bilobed

* Müller (On Cancer, p. 153) describes one between the optic nerves and corpora albicantia; and Rokitansky (B. i. p. 282), including both the tumours and the outgrowths, refers to examples of Lipoma in the submucous tissue of the stomach, intestines, and bronchi; in the subserous tissue of the pleura, peritoneum, dura mater, and cerebral ventricles; and in the lungs, liver, and kidneys.

† One, referred to in Lecture I., is in the Museum of St. George's Hospital. Other cases are related by Vogel (Path. Anat. tab. xxii. fig. 1); Gluge (l. c. Lief. viii.); Lebert (Phys. Pathol. ii. p. 105.) They are not rare in the corresponding parts of horses and other domestic mammalia. (Fürstenburg: Die Fettgeschwülste und ihrer Metamorphose; Berlin, 1851.)

mass of fat, enclosed in a thick capsule, and attached by a long pedicle to the intestine of an ox. In the trunk and limbs, they appear least frequent in the parts in which the natural fat, though abundant, is subject to least variations in its quantity; such as the palms and soles, and the bones; and they are rarely, if ever, formed in parts of or near the trunk where very little fat naturally exists, as the eyelids and the greater part of the scrotum. Fatty tumours have, indeed, been found in the scrotum;* and one very remarkable case is related by Mr. Lawrence and Sir B. C. Brodie: but, perhaps, such tumours have not begun to grow in the part in which they were at length found; they may have grown or shifted into it.

This shifting of fatty tumours is worth notice; for the fact may be used in the diagnosis of them when they occur in the groin or scrotum, or other unusual place.

A patient was under Mr. Lloyd's care, in St. Bartholomew's Hospital, with a strange-looking pendulous fatty tumour in the perineum. It hung like a pocket-flask between his scrotum and thigh; but he was quite clear that it was in his groin ten years before, and that it had gradually shifted downwards. It was removed, and no pedicle or other trace of it remained in the groin.

I find, also, a case by Mr Lyford,† in which a large fatty tumour began to grow in the abdominal wall, midway between the spine of the ilium and the pubes, and thence, as it increased, gradually moved downwards, and was excised from the upper and inner part of the thigh. And thus, in Mr. Lawrence's case, the tumour began to grow in the

* Gluge mentions one in the labium of a woman seventy years old. It was pyriform, and looked like a hernia (Path. Anat. Lief. viii. Taf. i. fig. 1.)

† Med. Gaz., iv. 348.

spermatic cord, and thence had partly extended and partly shifted into the scrotum behind the testicle, where it was extremely difficult to decide its nature.

The fatty tumours usually lie in the subcutaneous tissue, extending in it between the skin and the deeper fascia: but they may extend more deeply. Mr. Wormald removed one, from which distinct lobes or prolongations passed between the fasciculi of the trapezius muscle, and, expanding below them, were constricted by them. In the case of a great fatty tumour* of the neck, removed by Mr. Liston, the operation was made formidable by the lobes of fat extending deeply to the trachea and œsophagus. In rare cases, fatty tumours may be altogether deeply seated: I found one resting on the lesser trochanter of the femur, growing up by the side of the pectineus muscle, but not prominent externally. Vogel mentions the case of a woman who had several fatty tumours, one of which was so closely connected with the nasal bone and the nasal process of the superior maxillary bone, that it was necessary to remove these with it. Mr. Abernethy also refers to a fatty tumour, removed by Mr. Cline, which adhered to the capsule of the hip-joint.† In the Museum of the Middlesex Hospital is a fatty tumour one and a half inches long, which was removed from beneath the tongue, where it looked like a ranula; and in the College Museum‡ is one taken from the substance of the tongue.

Such are some of the chief facts respecting the structure of this kind of tumours. Of their life, I need say little.

Their development is, probably, like that of the natural fat.

* Mus. Coll. Surg., No. 190.

† See also Brodie, l. c.; Simon, Lectures on Pathology; and others.

‡ No. 1065.

Their growth is usually slow, and without pain or any affection of the adjacent parts; but they often grow capriciously, having uncertain periods of acceleration and arrest, of which no explanation can be given. The extent of growth cannot well be measured; for fatty tumours have been cut-out that weighed between fifty and sixty pounds, and such as these, after twenty, or even fifty years, were still growing, and might have continued to do so as long as the patient lived. I believe the largest in London is that in the Museum of St. Thomas's Hospital, which was removed from a man's abdomen by Sir Astley Cooper, and weighed 37 lbs. 10 oz.* One of the most formidable is that in the College-Museum, removed by Mr. Liston from a man's neck,† where it had been growing for twenty-two years. A parallel to it is drawn in the splendid work of Auvert.‡

What degenerations the fatty tumours may be liable to are not known; their diseases have some points of interest.

They may be partially indurated. The chief mass of a tumour may be found with the characteristic softness, pliancy, and inelasticity of fat; but in its substance one or more lumps, like hard knots, may be imbedded. So far as I have seen, these depend on induration, contraction, and a proportionate increase, of the fibro-cellular tissue of the fat; and the change is probably due to slow inflammation of the tumour. It may be sometimes traced to frequent pressure. A laundress had a fatty tumour, as large as a fœtal head, above her ilium, and portions of it were as hard to the touch as cartilage, and appeared to move so freely in the

* Medico-Chirurg. Trans. vol. xi. p. 440.

† No. 190.

‡ Obs. Med.-Chir. Tab. li. See, for a list of the largest elsewhere recorded, Mr. South's edition of Chelius's Surgery, ii. p. 691-2.

soft fat-tissue about them, that one might have thought them loose bodies, or fluid within cysts. Where these were, the patient had been in the habit of resting her linen-basket.

The indurated parts of a fatty tumour may be the seats of bone-like formations. This is, I believe, very rare; and I have seen only the single specimen in the Museum of St. Bartholomew's Hospital:* but Auvert describes the same change.†

Cysts, also, may form in fatty tumours. In the case with partial indurations just mentioned, I found, in another part of the tumour, a cyst with thin and partially calcified walls, which contained a glutinous and greenish oily fluid. I presume it is to tumours of this kind that Gluge gives the name of Lipoma colloides.

Suppuration and sloughing may occur in these tumours: but they are on the whole very rare events, except in large pendulous tumours, which have grown too large to be effectively nourished through their bases of attachment. Pathologically these changes have little interest; but in practice they are more important, as being almost the only way in which external fatty tumours are likely to lead to death. Even in these cases, however, they show no real imitation of malignant disease.‡ I once, indeed, saw a case in which the end of a pendulous fatty tumour in a woman's perineum was so ulcerated that it looked like cancerous disease: but after a week's rest in bed, during which the patient menstruated, it lost its malignant aspect. It now

* Ser. xxxv. 11.

† Tab. xvi.

‡ On the possible conjunction of fatty tumours and malignant disease, see Sir B. C. Brodie's Lectures, p. 282; and the same on the combination of fatty and mammary glandular tumours.

acquired (what the ulcers over and in fatty tumours commonly present) clean, inverted and over-hanging, wedge-shaped, granulating edges.

Lastly, respecting the causes of these tumours few things can be more obscure. Nearly all knowledge on this point is negative. The growth may have followed an injury, and we may call this the cause of its formation; but we can give no explanation why such an event as an injury, which usually produces only a transitory impairment of nutrition, or a trivial inflammation, should, in these cases, give rise to the production of a new and constantly growing mass of fat.

Fibro-Cellular Tumours.

Under this name I propose to consider the tumours which, in their minute structure and their general aspect, resemble the fibro-cellular, areolar, or connective tissue of the body. So far as I know, no general account of them is published. The first distinction of them was made, I believe, by Mr. Lawrence,* who described an admirable example in his paper on Tumours; and they are briefly but accurately described by Mr. Cæsar Hawkins,† as a softer and more elastic form of the fibrous tumour. Müller,‡ also, refers to them by the name of Cellulo-fibrous tumour; Vogel§ by that of Connective-tissue tumour (Bindegewebgeschwülste), comparing their tissue with that of the cutis; and Rokitansky‖ points to them as a variety of "gelatinous sarcoma." But

* Medico-Chirurg. Trans., vol. xvii. p. 14.

† Medical Gazette, vol. xxi. p. 925.

‡ On Cancer, p. 14.

§ Pathologische Anatomie, p. 185.

‖ Path. Anat. i. p. 336. Müller and others describe under the name of "Collonema" a tumour such as I have not seen, unless it be an example of very soft fibro-cellular tumour. Rokitansky (i. 335) describes it as a very soft, tolerably clear, flickering substance, like these passing references have not obtained for this kind of tumour a general recognition, and in many works it is altogether overlooked.

As in the last kind, so in this, we find instances of both outgrowths and tumours; *i. e.* of both continuous and discontinuous overgrowths. The former are, indeed, abundant and often described; for, among them, as being formed chiefly of overgrowing fibro-cellular tissue, are the most frequent forms of polypi of mucous membranes, and of hypertrophies of skin or cutaneous outgrowths.

1. Nearly all the softer kinds of POLYPI, growing from mucous membranes, consist of rudimental or more nearly perfect fibro-cellular tissue, made succulent by serous or synovia-like fluid infiltrated in its meshes: the firmer kinds of polypi are formed of a tougher, more compact, dryer, and more fibrous or fascia-like tissue. Of the softer kind, the best examples are the common polypi of the nose: mucous, gelatinous, or vesicular polypi, as they have been called. These are pale, pellucid, or opaque-whitish, pendulous outgrowths of the mucous membrane of the nose,—most frequently of that which covers the middle of its outer wall. They are soft and easily crushed, and in their growth they adapt themselves to the shape of the nasal cavity, or, when of large size, project beyond it into the pharynx, or, more rarely, dilate it. As they increase in size, so, in general, does the part by which they are continuous with the natural or slightly thickened membrane become comparatively thinner, or flatter: their surfaces may be simple and smooth, or lobed; they often hang in clusters, and thus

gelatine, of greyish-yellow colour. He briefly describes four specimens observed by himself. Bruch describes as a genuine example of Collonema what I can scarcely doubt was a very soft fibro-cellular tumour. (Ueber Carcinoma alveolare; in Henle and Pfeufer's Zeitschrift, 1849, p. 356).

make up a great mass, though none of them singly may be large. A clear ropy fluid is diffused through the substance of such polypi, and the quantity of this fluid, which is generally enough to make them soft and hyaline, appears to be increased when evaporation is hindered; for in damp weather the polypi are always larger. Blood-vessels enter their bases, and ramify with wide-extending branches through their substance, accompanying usually the larger and more opaque bundles of fibro-cellular tissue. Cysts full of synovia-like fluid sometimes exist within them.

To the microscopic examination these polypi present delicate fibro-cellular tissue, in fine undulating and interlacing bundles of filaments. In the interstitial liquid or half-liquid substance, nucleated cells appear, imbedded in a clear or dimly granular substance; and these cells may be spherical, or elongated, or stellate; imitating all the forms of such as occur in the natural embryonic fibro-cellular tissue: or, the mass may be more completely formed of fibro-cellular tissue, in which, on adding acetic acid, abundant nuclei appear. In general, the firmer the polypus is, the more perfect, as well as the more abundant, is the fibro-cellular tissue. The surface is covered with ciliary epithelium exactly similar to that which invests the healthy nasal mucous membrane, and supplies the most convenient specimens for the examination of active ciliary movement in human tissues.

The soft polypi that grow, very rarely, in the antrum, and other cavities communicating with the nose, are, I believe, just like these.* And those of the external auditory passage are, in structure, not essentially different. All that I have been able to examine appeared composed of rudimental fibro-cellular tissue;† but they are generally

* See Schuh, Pseudoplasmen, p. 75: the best account of polypi I have yet read.

† M. Lebert says the specimens he has observed were composed

more vascular, firmer, and less succulent than the nasal mucous polypi; they are also much more prone to inflammation and to superficial ulceration, perhaps through being so often connected with disease of the tympanum or its membrane. The mucous polypi of the uterus are also, I believe, like those of the nose.

A large, deeply lobed, soft, and nearly clear polypus in the urinary bladder, the only specimen I have seen in the recent state,* was composed, in part, of very fine filamentous fibro-cellular tissue, and, in greater part, of granular or dim homogeneous substance, with imbedded nuclei. Over the substance which these formed, there was an immense quantity of tessellated epithelium, with large scales, like those of the epithelium of the mouth: indeed, so abundant was this, that it formed the chief constituent of the smaller lobes of the polypus. Once, also, I have been able to examine a polypus of the rectum, which, being soft and succulent, might have been classed with these; but it was composed almost entirely of gland-textures. It was like a disorderly mass of such tubular glands, lined with cylindriform epithelium, as are found in the mucous membrane of the rectum. These were heaped together with some intersecting fibro-cellular tissue, and with abundant viscid fluid like synovia or thin mucus. The polypus was spheroidal, about two-thirds of an inch in diameter, and attached by a pedicle nearly an inch long to the anterior wall of the rectum: it received so abundant a supply of blood through the pedicle, that I think excision would have been very unsafe, unless I had first tied the base of the pedicle.

of fibro-plastic tissue. Professor Baum tells me he has generally found the surfaces of aural as well as of nasal polypi covered with ciliary epithelium.

* It is in the Museum of St. Bartholomew's, and is described by Mr. Savory in the Medical Times, July 31, 1852.

2. The best examples of Cutaneous Outgrowths, of which, as I have said, a second division of the fibro-cellular outgrowths is composed, are those which occur in the scrotum, prepuce, labia, nymphæ, clitoris and its prepuce.* These, which reach their maximum of growth in the huge "elephantiasis scroti" of tropical countries, consist mainly of overgrowing fibro-cellular tissue, which, mingled with elastic tissue, and with more or less fat, imitates in general structure the outer compact layer of the cutis. Their tissue is always closely woven, very tough, and elastic; in some cases it is compressible and succulent, as if anasarcous, and it yields, on section, a large quantity of serous-looking fluid; in others, it is much denser, interlaced with strong, shining bands, like those of a fascia; in others, it is meshed with intervening lobes of fat; and in others, is uniformly solid and glistening, yellowish, or with an ochre tinge, and like udder. The minute textures are, however, I believe, essentially the same among these diversities of general aspect; they are, in various proportions, the usual textures of the cutis and subcutaneous tissue, excepting (so far at least as present observation extends) the smooth muscular fibres. The diversities of external form are more numerous. In some, as, most commonly, on the nymphæ and prepuce of the clitoris, the masses are suspended by comparatively narrow pedicles; thus, also, are suspended most of the small cutaneous outgrowths that are common on the trunk and limbs; in some the bases are very broad, as in the nose, in which, moreover, the growth of skin is generally associated with acne

* I suppose that the disease named Molluscum simplex should be classed with these; but I have never seen an instance of it. The best accounts that I have read are by G. Simon: "Die Hautkrankheiten," p. 50 and 219, and Jacobovics; Du Molluscum.

and dilatation of its minute blood-vessels; in some, as in the elephantiasis scroti, a large extent of skin appears uniformly affected. Again, in different instances, they are lobed, or less deeply subdivided, or smooth or warty on their surfaces; healthy or darkened epidermis covers them; and the sebaceous glands and hair follicles sinking beneath their surfaces, as in the healthy skin, are not unfrequently considerably enlarged. In the elephantiasis of the extremities and of the scrotum, not only the isolation, but even the circumscribed appearance, of a tumour is lost; the affection is classed with the diseases of the skin rather than with tumours, and, in morbid anatomy, is, perhaps, not to be distinguished from the consequences of chronic or repeated inflammations of the integuments. In all cases, however, let the external form be what it may, there is such uninterrupted continuity between the several tissues of the overgrowth and those of the healthy cutis that the disease might be taken as the type of the "continuous overgrowths."*

Fibro-Cellular Tumours, properly so-called, are much rarer than the outgrowths of the same texture which I have just described. They are also rare, in comparison with other tumours; and this is singular, considering the abundance of the fibro-cellular tissue naturally existing, its general diffusion, its easy formation after injuries, in disease, and even in and about other tumours. I can in no wise

* Well-marked specimens of cutaneous outgrowths are in the Museum of the College, Nos. 2283 to 2290, 2466-7; 2708 to 2714; and in that of St. Bartholomew's, Ser. xi. 18, 19; Ser. xxviii. 18; and Ser. xxxii. 36, 37. I lately cut one from a man's nates (a very unusual place of growth), which weighed upwards of eight pounds. It had been growing for twenty years, and formed a great pendulous mass, on which he used to sit: its base covered the whole region of the glutei muscles.

explain the fact; but it is certain that for ten tumours formed of fat or cartilage (tissues which are rarely produced in other diseases), we do not find more than one formed of fibro-cellular tissue.

The form in which the fibro-cellular tumours are most frequently seen is that of oval or round masses of soft, elastic, close, and pliant tissue, smooth and uniform, or, when they grow among yielding parts, deeply and variously lobed. Their exterior surface is connected with the adjacent parts by a capsule of fibro-cellular tissue, which generally splits readily. When handled they feel peculiarly tense and elastic; their outer surface may shine like a thin sac full of fluid. On their sections we see opaque white bands, intersecting a shining succulent basis-substance of serous yellow or greenish yellow tint. Through this basis the bands course in circles or wavy lines, or form complete partitions; or, in the smaller lobes of the tumour, they run without order, only forming white marks on the yellow ground-colour, but giving no appearance of grain, or of regularly fibrous structure.

The peculiar yellow colour of the basis-substance of these tumours makes them look at first like fat; it is due, however, not to fat, but to a serous, or synovia-like, or very viscid, fluid, which is infiltrated through the substance of the tumour. The mass is just like anasarcous cellular tissue; most of all like the subcutaneous cellular tissue of the back, as one sees it dissected in a dropsical body. When such a tumour is cut through or sliced, the clear yellow fluid oozes from it, or may be abundantly pressed out; in alcohol the same fluid coagulates; in both cases, the filamentous tissue contracting, becomes denser and more compact, and more uniformly opaque white, like that of the softer varieties of fibrous tumour. It is to these last-named tumours, indeed, that the fibro-cellular have the nearest relations, and into them that they "pass" through gradational specimens; but there is just the same difference, as well as just the same relation, between these kinds of tumours, as there is between the natural fibro-cellular and fibrous tissues; and there is a similar propriety in distinguishing them.

Examined with the microscope, the fibro-cellular tumours display the filamentous tissue or appearance characteristic of that after which they are named. In many cases, or in many parts, parallel, soft, undulating filaments are found collected in fasciculi, which interlace, and from which single filaments can often be traced out (fig. 9); or, where this is not seen, the texture looks filamentous, through markings or wrinkles of the surface of a more homogeneous substance. The best developed and most filamentous tissue is in the

Fig. 9.*

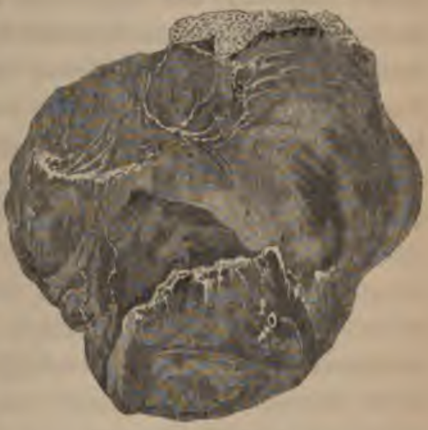
intersecting white bands: but similar tissue is usually present everywhere. In many instances abundant nuclei appear among the filaments, or imbedded in the more homogeneous substance, and acetic acid rarely fails to bring into view such nuclei in crowds. In many, also, cells like

* Microscopic elements of a fibro-cellular tumour, with cells in various stages of elongation and attenuation into filaments. Magnified about 450 times.

those of granulations, and others elongated and attenuated, appear as if in process of development into filaments.

The homology of these tumours, in respect of tissue, is thus as perfect as that of the fatty tumours. In chemical analysis they may yield gelatine from the well-formed fibro-cellular tissue; but I believe they yield much more albuminous matter from their imperfectly developed tissue, and from the serous fluid that is soaked in them.

FIG. 10.*



In general, there is nearly complete uniformity through the whole mass of one of these tumours. Oftentimes, however, different portions are more or less œdematous (if I may so call them); and, which is more remarkable, portions of cartilage, sometimes partially ossified, may be found in or over them. I have thrice seen this. In the first case nodules of cartilage were imbedded in a fibro-cellular tumour that grew in the ball of the great toe; in the second (a similar tumour from the thigh) (Fig. 10), a portion of its surface, and one of its chief partitions, were formed with cartilage partially ossified; in the third, a similar tumour from the thigh was thinly, but completely, encased with bone.†

* Section of a fibro-cellular tumour intersected with cartilage and partially encased with bone: reduced one-half. Described above, and p. 117.

† All these specimens are in the Museum of St. Bartholomew's Hospital.

Moreover, besides these differences dependent on mixtures of other tissues with those proper to the tumours, some may be found which are due to parts of the tumour being immature or imperfectly developed, and from this imperfect state degenerate. I have lately seen two such specimens, of which one was removed from the inner and deeper part of a gentleman's ham by Mr. Lawrence; and the other, seated between the superficial and deep muscles of a woman's fore-arm, was removed by Mr. Gay. The former was of three years', the latter of two years,' growth. Both were of oval form, deeply lobed, very soft, loosely connected by a thin capsule with the adjacent healthy parts, and about eight inches in chief diameter. Partitions, proceeding from the capsule, and including large blood-vessels, intersected the tumours, which were mainly composed of a bright serous-yellow, flickering, but tenacious substance, half pellucid, like size-gelatine. Opaque-white lines traversing this substance, gave it the general appearance of the softest and most succulent fibro-cellular tumours, or of the common mucous polypus of the nose.

These characters, which were common to large portions of both tumours, were, however, in some lobes of each, widely deviated from. In the tumour from the ham, some lobes were suffused and traced over with bright crimson and vermilion tints, and looked like lumps of size and vermilion ill-mixed for an injection. Other lobes had patches of buff-coloured or ochrey soft shreddy substance, or consisted almost wholly of such a substance. In the tumour in the fore-arm there was less appearance of vascularity, but the ochrey substance was more abundant, and parts of some lobes seemed liquefied in a turbid thick fluid of ochre or buff-yellow tint. In other portions it had a greenish-yellow hue, as if infiltrated with dried-up pus; in others, it was nearly white and brain-like; in others, it had mingled shades of pink and grey. But various as were the aspects of these tumours, so that with the naked eye it would have been extremely difficult or impossible to discern their kind, yet, in all parts, they showed microscopic structures characteristic of the fibro-cellular tissue in an immature state. Serous or synovia-like fluid oozed from them, but none that was pulpy or cream-like. The serous-coloured parts consisted mainly of well-formed fibro-cellular tissue, or of a clear imperfectly fibrillated blastema, with closely imbedded corpuscles, like nuclei. Many of these corpuscles were clear, but many were granular, as if with fatty degeneration, or appeared changed into small granule-masses. In the buff and ochre-coloured parts, similar tissue or blastema was sprinkled over, or was quite obscured, with minute shining black-edged molecules, like oil-particles, and with drops of oil. In other parts, some nuclei appeared like those of very soft cartilage; in others, crystals of cholestearine were mingled with the oily matter. In the greenish yellow parts, also, were corpuscles, like shrivelled pus-cells, mixed with fatty particles and debris; and again, in other parts, cells elongated like those of granulations.

No specimens could illustrate better than such as these the necessity of learning, as I have already said, to distinguish, in each tumour, the exceeding varieties presented in the phases of development of premature degeneration and of disease.

The most frequent seats of fibro-cellular tumours appear to be the scrotum, the labium or the tissues by the side of the vagina, and the deep-seated intermuscular spaces in the thigh and arm. They may occur, probably, in many other parts; but either they particularly affect these, or else a singular chance has shown them to me in these situations with unusual frequency.

In the scrotum I have been able to examine two cases, and have found records or notices of many more. The first case is represented in a large specimen in the Museum of St. Bartholomew's, and in a drawing made shortly after the parts were removed. The patient was a carpenter, 74 years old; and, when he was under Mr. Stanley's care, the tumour had existed four years. It was a huge mass, about a foot long, and six or seven inches wide, filling the scrotum, and drawing over it all the adjacent integuments. A collection of fluid, like a hydrocele, was at its lower part, a large hernial sac was above it, and the scrotum was thick and œdematous. The obscurities these complications threw upon the diagnosis of the tumour, the doubt how far the hernial sac might extend, the patient's age, and his aversion from any operation, were sufficient to dissuade from active interference.

The patient died about half a year after leaving the hospital. The tumour had attained the weight of twenty-four pounds; the testicle, with a distended tunica vaginalis, lay pressed-down below it, and the hernial sac was quite clear of it above. It was easily separable from the surrounding tissues, into which many lobes extended far from the chief mass, and on section appeared partitioned into lobes of various sizes and shapes. It had all the characters which I have described as belonging generally to these tumours, varied only by the unequal collections of blood or of serum, or by its various firmness of texture in its several portions.

A similar case was brought to St. Bartholomew's by Mr. C. R. Thompson, to whom I am indebted for the history. The patient was a parish-clerk, 70 years old, a sickly-looking man, and the tumour had been nine years in progress before his death. It was first noticed as a hardness just above the testicle; but, as it constantly increased in size, it filled the whole scrotum, displacing the adjacent integuments, and looking at first sight like an enormous hydrocele. Its surface was uneven and lobed, in some parts feeling hard and brawny, in some soft and fluctuating. For many years it was inconvenient only by its size and weight; but, about a month before death, one of its prominent parts sloughed, and hæmorrhage took place from it. After this, more extensive sloughing took place, and more considerable hæmorrhage, and the patient sank.

The tumour had the same characters as the last, except in the part that was sloughing, which was denser and more compact, and of dark, blood-stained colour, like congested liver. This might have been thought cancerous; but with the microscope I found only fibro-cellular tissue infiltrated with inflammatory exudation and blood; in other portions, unmixed fibro-cellular tissue.*

To these cases I might add one related by M. Lesauvages,† in which the tumour, in a man 70 years old weighed at least 44 pounds, and was of such size that, as the patient sat with it resting on his thighs, it reached to his sternum and beyond his knees. And another of the same kind is related by Dr. O'Ferrall, which he removed successfully; but, excellent as the surgery of this case was, its pathological completeness is marred by the suspicion that a small portion of it was of cancerous structure, and by the finding of a "solitary, hard, circumscribed tuber"

* The two foregoing cases are published by Mr. Thompson in the Medical Gazette, May 30, 1851.

† Archives Gén. de Méd. t. ix. p. 212, 1845. M. Lesauvages refers to another very probable case in which Bayle removed the tumour. It was of three or four years' growth, and as large as a head. The patient died, without return of the disease, seven or eight years afterwards.

in the patient's liver, when, some months after complete recovery from the operation, he died with phthisis.*

Of the similar tumours growing by the vagina, the best instance that I know is that recorded by Mr. Lawrence.† A portion of the tumour is in the Museum of St. Bartholomew's Hospital; and, though altered from its first condition, it proves the identity of the disease with that of which I have been speaking.

The patient was a lady, 28 years old, and the tumour, suspended from the labium and buttock as far as the coccyx, reached near to her knees, was as broad as her two thighs, and measured 32 inches in its greatest circumference. It had been growing four years, and produced no inconvenience except by its weight and bulk. It was soft and lobed, and the skin was loosely connected with it. Mr. Lawrence removed the greater part of this tumour; but a portion which advanced into the labium and along the side of the vagina could not be eradicated: this was therefore cut across; and, when it had grown again, was removed in a second operation two years afterwards. The patient then recovered perfectly, and is still living, without any return of the disease, more than twenty years after the operation.

* I am indebted for these particulars, beyond what were published in the Dublin Journal of Medical and Chemical Science, vol. i. 1846, to the kindness of Dr. O'Ferrall. Mr. Curling (On Diseases of the Testis, p. 51) refers to two cases of small "fibrous" tumours removed from the scrotum, in one of which the tumour was supposed to be a third testicle. These were probably of the kind here described. So, probably, were those referred to by Schuh (Pseudoplasmen, p. 69), in one of which a fatty tumour was combined with one of several "fibroid" tumours in a scrotum.

† Medico-Chirurgical Transactions, vol. xvii. p. 11.

Mr. Lawrence's account of the tumour, and its present appearance, leave no doubt that it was of this fibro-cellular kind.

A similar specimen, weighing more than 10 pounds, was removed by Mr. Liston from a patient 30 years old, in whom it had been growing many years, and a portion of it is in the Museum of the College (No. 2715). Many of smaller size have been removed from the same part;* and I have met with two which have presented the same disease in another phase.

A woman, 34 years old, had a tumour pendulous from the right wall of the vagina and the right nympha. It was a large flask-shaped mass, about five inches in diameter, attached by a pedicle about one inch and a half in length and thickness, over the upper part of which the orifice of the urethra was arched. All the lower part of the tumour was sloughing, and discharging an offensive ichorous fluid. The upper half was covered with healthy mucous membrane, and felt uniformly tough, pliant, and elastic.

The patient had noticed this disease for three or four years. It began as a tumour, projecting into the vagina from beneath its right wall, and in this situation acquired a large size before it protruded externally. It was punctured, and then grew more rapidly; but the protrusion did not take place till about ten days before I saw the patient. After this protrusion it enlarged very quickly, and, with the sloughing, the general health suffered severely. I removed

* Mr. Lawrence, l. c., refers to one by Mr. Earle. Cases are also described by Sir B. C. Brodie, Med. Gaz. vol. i. p. 484; Mr. Cæsar Hawkins, Med. Gaz., vol. xxi. p. 925; Mr. Curling, Proceedings of the Pathological Society, Part ii. p. 301; and (probably) by Dr. O'Ferrall, Dublin Journal, vol. i. p. 520, and vol. iv. p. 337. A specimen from a case by Mr. Keate is in the Museum of St. George's Hospital.

the tumour eighteen months ago, dissecting it out with little difficulty, and the patient, I believe, remains well.

It presented a well-marked instance of a very œdematous and sloughing fibro-cellular tumour, and microscopic examination found abundant inflammatory exudation mingled with the rudimental fibro-cellular tissue.

At nearly the same time I saw a case essentially similar to this; but the tumour was suspended from the labium, and the patient was about 60 years old. And this last fact is, perhaps, worth notice; inasmuch as, with this exception, all the cases of the fibro-cellular tumour by the vagina that I have met with have occurred in young women, while all the similar tumours in the scrotum have been in old men.

The occurrence of such tumours as these in the scrotum and labium may make it necessary that I should particularly say they are not the same disease as are the cutaneous growths which form the pendulous tumours—the elephantiasis, as it is sometimes called—of the same parts, and which I have already briefly described. The main differences are:—1st. That these fibro-cellular tumours may be separated or enucleated from the tissues among which they lie; whereas the cutaneous growths have no definite boundary, but are continuous with the proper tissue of the scrotum, or labium, or nympha: the two diseases have the common differences between tumours and outgrowths. 2d. In the growth of the fibro-cellular tumours, the surrounding parts, including the skin, or the mucous membrane, grow in adaptation to the tumour, but often defectively, or, at the most, only normally; but in the cutaneous outgrowths all the tissues take part, and the proper tissue and appended organs of the cutis are nearly as much exaggerated as the fibro-cellular substance. And 3dly. In the tumours, fibro-cellular tissue is the highest form attained, or, at most, a small quantity of elastic tissue is mingled with it; but, in the outgrowths, all the component structures of the skin and subcutaneous tissue are increased.

The two diseases are thus different. Still, the fact is significant, that the parts most liable to the cutaneous outgrowth are also those in or near which the fibro-cellular tumours most frequently occur; and it may be noted that, among those parts in which fatty tumours are most rare, the fibro-cellular are the most common.

For examples of fibro-cellular tumours removed from deep intermuscular spaces, I may refer to two specimens already described, and to two others in the Museum of St. Bartholomew's Hospital. One of these was removed twelve years ago, by Mr. Stanley, from an elderly man: it lay under the vastus internus muscle, and was easily dislodged from the cavity in which it was imbedded: it was a smooth, spheroidal mass, thinly incapsuled, and the bright yellowish colour of its surface made it to be regarded as a firm-textured fatty tumour; but the microscope found little or no fat in it, and its present aspect leaves no doubt of its nature. The patient died after the operation, and had no similar disease in other parts.

The second of these specimens was removed, by Mr. Savory, from beneath the tensor vaginæ femoris of a man 38 years old. It was of uncertain date, but had been observed about five months: it was firm, elastic, smooth, moveable, and painless. In the operation it was easily removed from its resting-place on the rectus muscle and the inferior spine of the ilium; the patient recovered perfectly, and has remained well for nearly two years.

This tumour was a smooth oval mass, measuring about 5 inches by 3½. Both in general aspect and in microscopic characters it might have been taken for a type of the species, except for the peculiarity of its being at one end capped with a layer of cartilage and cancellous bone, and having nodules of cartilage set along the course of one of the chief partitions between its lobes (Fig. 10).

To these specimens I may add another, in the College-Museum, of which Mr. Hunter has left the record that it was taken from the thigh, and had been supposed to be an aneurism.

These seem to be the most common seats of the fibro-cellular tumours, but I have preserved specimens from other parts. One was removed by Mr. Stanley from the sole of the foot, where, surely, we might have expected a fatty rather than any other tumour. The patient was a healthy man, 41 years old, and the deeply bilobed and very prominent tumour lay in the subcutaneous tissue over the metatarsal bones, with small lobular prolongations extending among the deeper-seated tissues. It was of eight years' growth, and nodules of cartilage were imbedded in the pliant and œdematous fibro-cellular tissue of many of its lobules.

Another of these specimens was removed by Mr. John Lawrence, with the testicle, within the tunica albuginea of which it appears to be entirely enclosed. The patient was a healthy-looking man, 37 years old, and the tumour had, in seven years, grown to a measurement of nearly six inches by four. When first removed, it was to the eye exactly like a fatty tumour, but it contained no fat, and was a typical specimen of fibro-cellular tumour in a very œdematous or anasarcous state.

A third was removed from over the upper part of a girl's saphena vein, by Mr. Skey. It was completely encased in bone; but its mass was perfect soft and elastic fibro-cellular tissue.

A fourth specimen is a tumour which I removed from the orbit of a man 40 years old, in whom it had been growing for about eighteen months. It has the general and microscopic characters of the species, but is very soft, and is composed of a cluster of small masses, looking almost like a bunch of small gelatinous polypi of the nose.*

A fifth is an oval bilobed tumour, about half an inch in diameter, which I removed from a young man's tongue, in the very substance of which, near its apex, it had been growing for three years. It was firmer than most of the others; yet succulent, and formed of an obscurely filamentous tissue, abundantly nucleated.

The specimens to which I have now referred will be sufficient, I think, to justify the giving a distinct name to the kind of tumour of which they are examples. There may be found, indeed, many specimens that will connect these with fibrous tumours; but, as I have already said, if we may, among the natural tissues, distinguish the fibro-cellular from the fibrous or tendinous, so should we make a corresponding distinction of the tumours that are respectively like them.

I need only add a few words respecting the general history of these tumours. They have been found, I believe, only in or after the adult period of life, and in persons with apparently good general health. Their causes are wholly unknown. Their development appears to be, in most cases,

* Three cases of tumour in the orbit, which, I think, must have been like this, are described by Schuh (p. 63) under the names "Zellgewebsschwamm," "Fungus cellulosus." Besides the specimens above described, which are all in the Museum of St. Bartholomew's, I have seen two removed from the scalp, both of which, before removal, were supposed to be cutaneous cysts. A tumour removed by Mr. Humphry (Lectures on Surgery, p. 187) from a finger, and one described by Lebert (Phys. Pathol., t. ii. p. 173) as a fibrous tumour of the neck, were probably of this kind.

like that of many examples of natural fibro-cellular tissue, through nucleated blastema; but I have often found in them abundant cells lengthening and attenuating themselves into fibres, as in the organizing of lymph or granulations. These may have been formed from exuded lymph: yet I am more disposed to think them proper rudimental parts of the growths; for they are often peculiarly well marked, and have no appearance of being produced in disease.

The growth of these tumours is quick, in comparison with the average rate (so far as we can roughly estimate it) of innocent tumours. They often enlarge very quickly; but this enlargement is probably not growth, but swelling, through increase of the œdematous effusion: (and this difference between growth and swelling may be usefully remembered in the diagnosis of many tumours). The growth is usually painless; but about the vagina is apt to be too rapid for the superjacent tissues. Its possible extent is very great. I have mentioned one tumour of 44 pounds weight, and another of 24 pounds, which was still growing.

Of the diseases of these tumours nothing has been yet observed, except the sloughing and suppuration that occurred in one of the cases I have mentioned. As to their nature, all that has been said implies that they are completely innocent; and I have seen no sufficient reason to doubt that they generally, or always, are so. Once, indeed, I think such a tumour recurred after removal; and once, in the testicle, a small growth of medullary cancer existed near, but separate from, a large fibro-cellular tumour: but these are the only suspicious cases I have known.

Painful Subcutaneous Tumours.

A group of tumours, peculiar for the pain with which they are connected, are thus named, and are so remarkable as to justify giving a description of them separate from that of the fibro-cellular and fibrous tumours, with which, considering their other characters, the chief examples of them might be placed.

The painful subcutaneous tumour, or tubercle, has been often well described in relation to its general characters. Its intense painfulness was too striking to escape observation. It was described by A. Petit, Cheselden, Camper, and others; but the first, and to this time the best, general account of the disease, drawn from many instances, was given by Mr. William Wood, in 1812.* Dupuytren added many instances to those which he copied from Mr. Wood's paper, and made the disease much more widely known.†

The especial seat of growth of these little tumours is, as their name implies, in the subcutaneous cellular and adipose tissue. They are most frequent in the extremities, especially the lower: very rarely they occur on the trunk, or the face.‡ They are about four times more frequent in women than in men; they rarely, if ever, begin to form before adult life, or after the commencement of old age. It is seldom that local injury, or any other cause, can be assigned for their occurrence. The tumour usually lies just beneath the skin, scarcely prominent; it has a capsule loosely connected with all the surrounding parts, unless it be to the cutis, to which it may be tightly fixed, and which,

* Edinburgh Med. and Surg. Journal, viii. 1812. Mr. Wood first gave these tumours the appropriate name which they have since borne.

† Leçons Orales, i. 530. He named them fibro-cellular encysted tumours.

‡ One is mentioned by Mr. Cæsar Hawkins, as removed from the cheek by Sir B. C. Brodie (Medical Gazette, vol. xxi. p. 926); and one by Dupuytren.

in such cases, is generally thin, tense, polished, and like a superficial scar. Sometimes the small blood-vessels of the skin over and around the tumour are enlarged and tortuous, like those near a cutaneous nævus; but, else, all the adjacent parts appear healthy.

Tumours of this kind rarely exceed half an inch in diameter; they are usually spheroidal, oval, or cylindriform; they are firm, nearly hard, tense, and very elastic. Their outer surface is usually smooth, bright, yellowish, or greyish, or pure white; and their sections have the same aspect and consistence, or are varied by an obscure appearance of pure white fibres traversing a greyish basis.*

Among the painful subcutaneous tumours that I have been able to examine microscopically, one was composed of dense fibrous tissue, with filaments laid inseparably close in their fasciculi, and compactly interwoven. These appeared to have been formed in or from a nucleated blastema; for thick-set, oval, and elongated nuclei were displayed when acetic acid was added. Another was composed of well-formed fibro-cellular tissue, with bundles of parallel undulating filaments, matted or closely interwoven. With these were elongated fibro-cells, the products, perhaps, of inflammation, to which the tumour appeared to have been subject. The substance between the filaments, and that from which they were probably developed, was here, also, a nucleated blastema. A third specimen presented obscure appearances of a filamentous structure, but no separable filaments: it seemed composed wholly of such nucleated blastema as was exposed by the action of acetic acid on the

* Sometimes the tumour has a central cavity filled with fluid, as in two cases by Mr. Carruthers, in Edin. Med. and Surg. Journ., vol. xxxiii.; but it is observable that in one of these, occurring in a man, a visible nerve was connected with the tumour. Perhaps this was a neuroma; for in these the cystic character is not unfrequent.

former specimens. In some parts, also, this presented appearances of filaments and nuclei arranged in concentric circles around small cavities.* A fourth, which had existed for many years at the end of a woman's thumb, consisted of large clear nuclei in a dimly-shaded homogeneous substance.

From these examples, or, at least, from the first three, we may believe that the painful subcutaneous tumours may be formed of either fibro-cellular or fibrous tissue, in either a rudimental or a perfect state. They may also, I believe, be fibro-cartilaginous, as described by Professor Miller,* and by many other writers. But whatever such slight diversity of tissue they may present, the characteristic of all these tumours is their pain; pain which may precede all notice of the tumour, or may not commence till much later, or may be contemporary with it, but which, when once it has set in, may rise to very agony, such as I suppose is not equalled by any other morbid growth. It is not often constant; but, generally, without evident cause, or with only a slight touch of the tumour, a paroxysm of pain begins, and, gradually increasing, soon reaches a terrible severity. Beginning at or near the tumour, it gradually extends into all the adjacent parts, often flashing, like electric shocks, from one part of the limb to another, or to the whole trunk. Such a paroxysm may continue for a few minutes, or for several hours; then it gradually subsides, leaving the parts sore and tender. While it lasts, the tumour, whatever may be its condition

* Like those drawn from a fibrous tumour of the uterus by Prof. Bennett (On Cancerous and Cancroid Growths, p. 189).

† Principles of Surgery, p. 630. An engraving, from the sketch by Prof. Bennett, makes this the only sure instance of fibro-cartilaginous structure. In the other recorded cases the microscope was not used; and the naked eye cannot discern between fibrous cartilage and dense fibrous tissue.

at other times, is always exquisitely sensitive: the muscles of the limb may act with irregular spasms; or general convulsions, like those of an epileptic seizure, may ensue; or, the patient falls as if sunk by the intolerable pain, and faints. Sometimes, too, the tumour itself swells, the blood-vessels around it become larger and more tortuous, and the skin becomes œdematous or congested, imitating the change which sometimes ensues in a neuralgic part. There are many diversities in the characters and modes of the pain; but this belongs to all the instances of it,—that its intensity is altogether disproportionate to its apparent cause, and that it cannot be explained by anything that can be seen in the structure or relations of the tumour.

This pain suggests interesting questions in relation to the pathology of all tumours; but, before considering it, let me add some facts to complete the history of these. They appear usually to be of very slow growth. One, which I removed from the end of a thumb, had existed fourteen years, and was less than a quarter of an inch in diameter. Another, which I removed from the leg of an elderly woman, had gradually increased for ten years; yet, at last, it was less than half an inch in diameter. In other cases they may more quickly attain the same size; but this seems their limit; and, for any number of years, they may remain sources of intense pain, and yet undergo no apparent change of size or structure. They are usually single. I have found only one case in which more than one existed: in this case three lay close together over the great gluteal muscle.* When excised, they are not apt to recur. I removed one from the back of the leg of a lady 28 years old, from whom, two years previously, a similar growth was excised from the same part. After the first

* W. Wood, l. c.

operation the pain was scarcely changed; after the second it ceased, and never returned. Sir Astley Cooper* removed two painful tumours, at an interval of a year, from a young lady's leg; but these are the only instances of apparent recurrence that I have found. I believe that they have no tendency to ulcerate, or to assume any of the peculiar characters of malignant disease.†

In considering, now, the painfulness of these tumours, the first question is their relation to nerves: are nerves involved in them? and do they, as Velpeau‡ seems to hold, differ from neuromata, *i. e.* from the fibrous or fibro-cellular tumours within the sheaths of the nerves, only in their position? are they only tumours within the superficial or subcutaneous nerves?

The general opinion is against this supposition. Dupuytren says that he dissected several of these tumours with minute care, and never saw even the smallest nervous filaments adhering to their surface. I have sought them with as little success with the microscope. Of course, I may have overlooked nerve-fibres that really existed. It is very hard to prove a negative in such cases; and cases of genuine neuroma, *i. e.* of a fibrous tumour within the sheath of a nerve, do sometimes occur which exactly imitate the cases of painful subcutaneous tumour. Such a case was under Mr. Stanley's care two years ago. An elderly gentleman had for two years observed a small subcutaneous tumour over

* Illustr. of Diseases of the Breast, p. 84.

† Dr. Warren (On Tumours, p. 60) speaks of a malignant form of the disease in which the lymphatics are affected, but relates no case of it. The case requiring amputation which he relates appears to have owed its severity to the treatment. Dupuytren (Leçons Orales, i. 542) says they have or may acquire a scirrhous nature, and then end with cancerous softening; but he refers to only one case justifying such expressions, and this case is imperfectly described.

‡ Médecine Opératoire, tom. iii. p. 101.

the lower part of the semi-membranosus muscle. It was easily moveable, and, till within the last three months, had not been inconvenient; but at this time it became the seat and source of pain exactly like that of a painful subcutaneous tumour. It was removed; and I was able to trace, with the microscope, an exceedingly slender nerve, the filaments of which were spread-out over one part of the tumour. The tumour was within the neurilemma, and was uniformly firm, elastic, yellowish, and composed of well-formed fibrous tissue.

Many that have been called painful subcutaneous tumours may have been such neuromata as this was. Still, I am disposed to think that most of them are only so connected with nerves as ordinary innocent tumours are, that receive a few nerve-fibres in their substance. For (1) the connection of the nerves with even very small neuromata is not so difficult to demonstrate, but that it should have been found, if it had existed, in some of the many painful tumours that have been examined. (2) The neuromata often occur in large numbers in the same patient; the painful subcutaneous tumour is nearly always single. (3) The neuromata usually grow constantly, and seem to have no limit of size; even when subcutaneous, they commonly exceed the size of the painful tumours, which generally grow to a certain small size, and in it remain stationary. (4) Neuromata are most frequent in the male, the painful subcutaneous tumours in the female sex. An analysis of 26 cases of neuroma taken promiscuously showed that 19 had occurred in men, and 7 in women; while in 28 cases of painful subcutaneous tumours 23 were in women, and 5 in men; evidence which is almost conclusive for the different natures of the two diseases.

However, even if it could be proved that these painful tumours are within nerves, the question respecting the source of pain would not be fully answered. We cannot ascribe the pain to merely the altered mechanical condition of the nerve-fibres; for tumours that are evidently within nerves are not always, nor even usually, painful. It is remarkable that, in nearly all the cases in which large tumours have existed in the trunks of nerves, there has been little or no pain. The facts collected by Mr. Smith* are clear on this point. Moreover, the subcutaneous tumours themselves often remain long painless, and then become, without any other apparent change, extremely painful; and there are instances of tumours exactly resembling them, except in that pain has never been felt in them. I removed such an one from a lady's forehead. It was about as large as a pea, had been two years growing in the subcutaneous tissue, and had never given pain except once, when it was severely struck. It had all the apparent characters of structure of the painful subcutaneous tumour. I repeat, therefore, that we cannot assign the pain in these cases entirely to an altered mechanical condition of nerve-fibres in or near the tumour. We must admit, though it be a vague expression, that the pain is of the nature of that morbid state of nerve-force which we call *neuralgic*.

Of the exact nature of this neuralgic state, indeed, we know nothing; but of its existence as a morbid state of nerve-force, or nervous action, we are aware in many cases, in which we can as yet trace no organic change, and in many more, in which the sensible organic change of the nerves is inadequate to the explanation of the pain felt through them. In both these sets of cases we assign the pain (speaking vaguely) to a functional, rather than to an organic, disorder of the nerves; to a disorder commencing in the nerves of the part which is the focus of the pain, but transmitted from

* Treatise on Neuroma.

them to others which, in the nervous centres, are connected with them.

With this view of the neuralgic nature of the pain in the subcutaneous tumours many of their characters and circumstances agree. The pain is commonly paroxysmal, and sometimes regularly periodical; it is diffuse, or flashing, electric, and most intense; it often excites reflex spasmodic movements, or more severe and general convulsions; though not peculiarly frequent in persons of extreme sensibility, yet it is often aggravated by mental emotions, and the other excitants of neuralgic pains; it is sometimes increased, or first felt, about the time of the cessation of the menstrual discharge; it sometimes remains at or about the seat of disease for a long time after the removal of the tumour; it is sometimes attended with what is regarded as reflex vascular fulness, but it precedes no organic change.

The consideration of the probably neuralgic nature of the pain in and about these tumours is of interest in relation to the pathology of many others. The pains of many other tumours are probably, in greater or less measure, of the same nature.

The irritable tumour of the breast may be called a neuralgic tumour. Sir Astley Cooper's plates show, indeed, that some which he thus called were like the painful subcutaneous tumours; but the more frequent are, I believe, mammary glandular tumours, imitating in their structure the mammary gland itself. I derive this belief from the general appearance and description of several specimens, and from what I found in two cases with the microscope. A woman, 45 years old, was under my care with a small tumour lying deep in her breast, which felt hard and not moveable, except with the tissue around it. She had been aware of this tumour for a month, and during all the time it had been the source of intense "darting and dragging" pain, which often extended from it through the chest to the shoulders, and along the neck and arms. The pain was described as so like that commonly assigned to cancer of the breast, that, judging from it, and from the age and other circumstances of the patient, one could not but fear she had cancer. The doubt rendered it proper to make an exploratory incision at the commencement of the operation. This was done, and the tumour, having no cancerous aspect, was alone removed. It proved to be a perfect example of mammary glandular tumour, such as I shall more fully describe in a future lecture. Thus the case seemed to be one of mere neuralgia in a glandular tumour of the breast: and it may be added, that it was only a striking instance of an ordinary fact; for such tumours are often at times extremely painful.

Similar instances might be found, I believe, in tumours of other structures; but, without entering further on their history, I would suggest that the account of all these painful tumours makes it probable that the pain the patients feel is, in great measure, neuralgic or subjective; that it has the tumour, indeed, for an exciting cause; but that it owns, besides, some morbid condition inherent or cumulative in the nerves themselves, so that at times they respond, with a morbid exaggeration, to an habitual or slightly increased stimulus. And if this be true of the most painful tumours, it is probably true, in various measures, of many others.

LECTURE V.

FIBROUS TUMOURS.

THE name of "fibrous tumour" appears the best, among the sixteen or more, by which different writers have described the tumours whose chief characteristic is their likeness to the natural fibrous or tendinous tissue of the body. This, at least, seems the best for a general designation; and to those among them which are constructed of more than one elementary tissue we may give such names as "fibro-muscular," "fibro-elastic," "fibro-cartilaginous," &c.

The most frequent and notorious examples of the species are the fibrous tumours, or fibrous bodies, of the uterus; the "hard, fleshy tubercle of the uterus," as it was described by Dr. Baillie. From these, chiefly, the general, though not all the microscopic, characters of the species may be described.

First, however, the usual distinction must be drawn between the tumours and the outgrowths of the same structure. The uterus presents examples of both.

The FIBROUS POLYPI of the uterus, more properly so-called, are continuous outgrowths of and from the substance of the uterus; the mucous membrane and the muscular and fibrous tissues of the uterus, growing, in variety of proportions, into its cavity and that of the vagina. The fibrous tumours, are discontinuous growths of similar tissue in or near, not of, the substance of the uterus.*

The distinction is often difficult to make during life; for the pendulous, polypoid, and narrow-stemmed outgrowth may be imitated, in all its external characters, by a tumour growing near the surface of the uterus, and projecting into its cavity, with a gradually thinning investment of its muscular and mucous tissues. On dissection, however, or in such a section as the adjoining diagram (Fig. 11) may represent, the continuity of the polypus or outgrowth, A, and the discontinuity of the more commonly occurring tumour, B, may generally be discerned, even in specimens which, like two in the Museum of St. Bartholomew's Hospital, are, in external appearance, exactly alike (xxxii. 12 and 34).

FIG. 11.†

Similar differences exist among what are classed together

* The distinction is expressed by M. Cruveilhier (Anatomie Pathologique) by the terms "corps fibreux implantés," and "corps fibreux non implantés;" but the "corps fibreux" of the breast, which were described by him, and led to the renowned discussion at the French Academy of Medicine, were, for the most part, mammary glandular tumours, and nearly solidified proliferous cysts.

† Fig. 10, diagram-sections of an uterine outgrowth (A) and of an uterine tumour (B). Both are like polypi, but the former is continuous with the substance of the uterus; the latter is discontinuous.

as fibrous tumours of bone or periosteum: some, as we shall see, are tumours; some are outgrowths, and the line of distinction cannot be well drawn.

Fibrous outgrowths are also, sometimes, found in the form of polypi suspended in the pharynx, or in the chambers of the nose, or in some of the cavities communicating with them. But I have not been able to examine any of these minutely in the recent state; and I have seen so few in any condition, that I cannot tell whether some, or even many, of them are not separate fibrous tumours, projecting the mucous membrane, and pendulous, as fatty tumours often are, when they grow just beneath the cutis. Neither the description by Schuh, accurate as it is in other points, nor any other that I remember, decides this. The same uncertainty exists as to the relations of the extremely rare fibrous polypi of the œsophagus and larynx. The fibrous structure of all these growths is well-marked, but comparatively soft and elastic, and intermediate between the structures proper to the typical examples of the fibro-cellular and the fibrous tumours.

The Fibrous Tumours, of which alone I shall now speak, appear to have a natural tendency towards a spherical or oval shape, with a smooth or superficially lobed surface; but from these marks they often deviate, in adaptation to mutual pressure or the different resistances of surrounding parts. When, for example, a fibrous tumour is pendulous, its more dependent portion usually grows most, or is most swollen; it tends from the spheroidal to the pyriform shape, but retains a smooth surface: when one grows into a cavity, it is apt to assume the shape of that cavity, whatever it may be, or else to become deeply lobed. Such varieties as these are often seen in the fibrous tumours of the upper jaw, according as they grow into the cavity of the mouth, or in other directions; and greater diversities occur among many specimens of the fibrous tumours of the uterus.

The fibrous tumours growing in solid organs have usually a complete fibro-cellular capsule; and in the uterine walls this is peculiarly dry and loose, so that, when one cuts on the tumour, it almost of itself escapes from its cavity. So, too, are covered the fibrous tumours in the subcutaneous tissue and in the nerves, and those parts of the fibrous tumours and outgrowths from bones which are in contact with other tissues than those from which they spring.

To the touch, the fibrous tumours are usually very firm, often extremely so; they may even be as hard and incompressible as hard cancers. If they are soft, or "fleshy," or succulent, it is, I think, always through œdema or inflammatory softness and infiltration of their substance; for such characters as these are rare, except in the case of the pendulous or protruding tumours, or in those that are manifestly diseased. Moreover, in all ordinary cases, the fibrous tumours are heavy, very elastic, and very tense, so that their cut surfaces rise in convexities, like those of intervertebral fibrous cartilages.

In the examination of sections, of which Fig. 13 may represent an ordinary example, the most usual characters that one sees are, that the tumours present a greyish basis-substance, nearly homogeneous, and intersected with opaque, pure white bands and lines. They have a general resemblance in their aspect to a section of fibrous cartilage, such as that of the semilunar or the intervertebral cartilages. Many varieties, however, appear; the basis-substance tending towards yellow, brown, or blue, and the white lines being variously arranged.

It would be tedious to describe minutely these various arrangements: let it suffice that there are three principal, but often mingled, plans.* In some tumours, the bundles of white fibres tend to construct concentric circles round one or many centres; so that, in the section, we have a vague imitation of the aspect of one or more intervertebral fibro-cartilages, the appearance of concentric curved fibres representing an arrangement of layers successively enclosed, in the same involute manner as I described in one of the varieties of fatty tumours (p. 94). These are generally the hardest and least vascular of the fibrous tumours; usually, too, they are spherical.

In another variety of the tumours, the white bands course in variously sweeping curves and undulations, the components of the larger bundles diverging and interlacing.

In yet another variety, the fibres are less fasciculate, and appear as if closely matted in a nearly uniform white substance; and, in the extreme specimens of this form, which are most commonly found on or in the jaw-bones, a fibrous structure is scarcely to be discerned with the naked eye: they look nearly uniform, glistening, pale or white, and very firm; but the microscope proves their identity with the other varieties.

As on the exterior, so in sections, these tumours present various degrees of lobular arrangement. Some are uniform and scarcely partitioned; while others are formed in distinct and easily separable pieces; and between these are numerous intermediate forms.

As a general rule, the vascularity of a fibrous tumour is in an inverse proportion to its singleness and toughness of construction; for the blood-vessels, as in the natural fibrous structures, are distributed chiefly or exclusively in the fibro-cellular tissue partitioning and investing the denser substance. The tumours thus present various degrees of

* See Nos. 2666, 2671, 2672, in the Museum of the College of Surgeons.

vascularity. Some, when the vessels of the uterus are fully injected, appear still quite white; but some appear as highly coloured with the injection as the uterus itself.*

In microscopic examination, one finds, among the fibrous tumours, certain varieties of composition which are not always, if at all, expressed in their more manifest characters. In all, I believe, a large portion of the mass consists of tissue resembling the tendinous or fibrous; being composed of exceedingly slender, uniform, pellucid filaments, undulating or crooked, more or less perfectly developed, and variously arranged.† This is the case in all parts of the tumour; in the more homogeneous basis-substance as well as in the intersecting bands; the microscropic differences between these parts consisting, I think, only in the less or more regular arrangement of the fibrous structure or fibrous appearance of the tissue. But in different specimens, or even in different parts of the same, the tissue appears less or more perfectly formed; so that, while in some, distinct filaments or undulating fasciculi may be dissected out, in others there is rather a fibrous appearance than a fibrous structure. Commonly, too, one finds nuclei or cytoblasts strewn through the substance of the tumour; the less abundantly, I think, the more perfect is the fibrous character of the tissue. But in all these respects, there are not, I think, more or other differences among fibrous tumours than in a series of natural fibrous tissues.

With these constituents other elementary tissues are mingled in certain fibrous tumours. In those in the uterus, (just as in the uterus itself), smooth or organic muscular

* Remarkably good specimens illustrating this point are in the Museum of the Middlesex Hospital.

† Some of the best examinations are by Valentin, in his Repertorium; and by Bidder, in Walter, Ueber fibröse Körper der Gebärmutter, p. 37.

fibres are more or less abundant. I have not, indeed, seen such a specimen as would quite justify the name of "muscular" tumours, assigned by Vogel: but the mingling of the muscular fibres, in imitation of the tissue of the uterus, is usual, if not constant, in these tumours (Fig. 11 A).

FIG. 11 A.*

In the subcutaneous fibrous tumours, and in some, I believe, of the uterine tumours also,† elastic fibres, with all their fully developed characters, may be intermingled with the more abundant fibrous tissue. The structure of fascia is thus imitated; and, if we were to call those last mentioned "muscular" tumours, these should be named "fascial."

Again, in the fibrous tumours on bones, bone, in small plates or spicula, is often present; or there may be mixtures of fibrous and cartilaginous tissue. Possibly, also, other mixtures of tissues may occur in what we commonly accept as fibrous tumours; but I suppose that a general statement may be truly made, to the effect that the common characters of fibrous tumours, such as I just described, are usually modified towards an imitation of tissues in or near which they are severally placed.

Their structural homology is thus complete; and I presume they may be equally similar in chemical properties. They yield gelatine on boiling; but I am not aware of any examination of their other constituents.

* Fig. 11 A, Minute structure of an uterine fibrous tumour. Narrow smooth muscular fibres project from the edges of a fibrous tissue. Magnified about 400 times.

† See Bidder, in Walter, l. c., p. 38. I have found, also, in a subperitoneal fibrous tumour in the stomach, elastic fibres just corresponding with those of the natural subperitoneal tissue.

To the varieties of the fibrous tumour already named, two must yet be added, depending on changes which we may regard as results of disease or degeneration. One consists in the formation of cysts, the other in the deposit of calcareous and other salts in the substance of the tumour; suggesting, severally, the names of the "fibro-cystic," and the "fibro-calcareous" tumour.

The formation of cysts is not rare in fibrous tumours, especially in such as are more than usually loose-textured. It may be due to a local softening and liquefaction of part of the tumour, with effusion of fluid in the affected part; or to an accumulation of fluid in the interspaces of the intersecting bands; and these are the probable modes of formation of the roughly bounded cavities that may be found in uterine tumours. But in other cases, and especially in those in which the cysts are of smaller size, and have smooth and polished internal surfaces, it is more probable that their production depends on a process of cyst-formation, corresponding with that traced in the cystic disease of the breast and other organs. The whole subject, however, in relation to the origin of the cysts, needs further consideration; and I will speak only of the general appearance of the fibro-cystic tumours.

First, then, we find certain examples of fibrous tumours thickly beset with numerous well-defined and lined cysts. This appears to be the nature of the "hydatid testis" described by Sir Astley Cooper. The specimens that I have seen of it make me think that it is, essentially, a fibrous or fibrous and cartilaginous tumour in the testicle, with more or less of cyst-formation in the tumour. For, upon or around the tumour, the seminal tubes or their remains may be traced outspread in a thin layer, and without difficulty separable; and the substance of the tumour is a distinct mass of common fibrous tissue with or without imbedded nodules of cartilage, and with a variable number of imbedded cysts, filled with pellucid serous or viscid contents. A similar condition may be found, but is rare, in fibrous tumours of the uterus. It may be found, also, I believe, in fibrous tumours in nerves and other parts.

In another set of cases, we find one large cyst existing alone, or far predominating over all the others, in a fibrous tumour. This is most frequent in the tumours in the nerves,* and in the uterus. In the latter organ it has peculiar interest, because the cyst, if it attain a great size, may be mistaken and treated for an ovarian cyst. Several such cases have happened. The preparation from one is in the Museum of the College (No. 2657); the history of which, sent by Sir Everard Home, is, that it is "A portion of an uterus, in which a very large encysted tumour had formed. The patient had been twice tapped, and the cyst emptied. The case was supposed to be ovarian dropsy during life." In another case, Mr. Cæsar Hawkins, suspecting ovarian disease, drew fifteen pints of fluid from a great cyst in a fibrous tumour of the uterus.† The patient died a long time afterwards, and the specimen, which is in the Museum of St. George's Hospital, shows an enormous fibrous tumour in the side wall of the uterus, having one vast cavity, and in its solid part many small cysts.

With regard to the *fibro-calcareous tumour*, it is to be observed that two methods of calcification exist; a peri-

* See Smith on Neuroma, p. 6.

† Medical Gazette, vol. xxxvii. p. 1022. This specimen and others are described by Mr. Prescott Hewett in the London Journal of Medicine. See, also, on suppuration in these cysts, Dr. Robert Lee, in the Med.-Chir. Trans. vol. xxxiii. Two remarkable cases of the same kind are related by Schuh (Pseudoplasmen, p. 165.) In one of them, the huge cyst in the uterine tumour produced the greatest enlargement of the abdomen that he ever saw.

pheral, and an interstitial. In the former, which is the rarer, an ordinary fibrous tumour is coated with a thin, rough, nodulated layer of chalky or bone-like substance.* In the latter method, a similar substance is deposited more abundantly throughout the tumour, and is usually so arranged, that, by maceration, one obtains a heavy hard mass, variously knotted and branched like a lump of hard coral. Such a specimen is in the College Museum (No. 226): it was found in a graveyard, and was sent to Mr. Hunter as an urinary calculus. It is an oval coral-like mass, about five inches long. On analysis, it yielded 18·644 per cent. of animal matter, consisting of gelatine, with a small proportion of albumen; and its other chief constituents were found to be phosphate and carbonate of lime, the proportion of carbonate being greater than in human bone.

FIG. 12.†

A similar, but larger, specimen is in the Museum of St. George's Hospital; and one yet larger in that of the Middlesex Hospital, which has been described, with a history full of interest, by Mr. Arnott.‡

Now the change which ensues in these cases is not ossification; true bone, I believe, is not formed in the fibrous tumours of the uterus. The change is a calcareous degeneration, consisting in an amorphous and disorderly deposit of salts of lime and other

* As in Mus. Coll. Surg. No. 2670.

† Calcareous deposit in a fibrous uterine tumour: copied from Dusseau.

‡ Medico-Chirurgical Transactions, vol. xxiii. p. 199.

bases in combination with, or in the place of, the fibrous tissue.* It is represented, from Dusseau's plate, in the adjacent figure (fig. 11). The process is important, as being the manifestation of a loss of formative power in the tumour. The calcified fibrous tumours probably never grow, and are as inactive as the calcified arteries of old age.†

With these degenerations I may mention, (though it has probably more of the nature of a disease), a softening of fibrous tumours, in which, quickly, and apparently in connection with increased vascularity and congestion, they become œdematous, and then, as their tissue loosens, become very soft, or even diffluent, or else break up, and appear shreddy and flocculent. In this state the outer and less softened part of the tumour may burst, or they may separate or slough.‡

The most frequent seat of fibrous tumours is, beyond all comparison, in the uterus. Indeed, we may hold that the fibrous uterine tumours are the most frequent of all innocent tumours, if Bayle's estimate be nearly true, that they are to be found in 20 per cent. of the women who die after 35 years of age. But I shall not dwell on the fibrous tumours in the uterus, fully described as they are by Dr. Robert Lee, and other writers on uterine pathology. I will only say, that such tumours may occur near, as well as in, the uterus; but that, in respect of this nearness, they are probably limited to those parts in which fibrous and

* On the appearance of a crystalline form in the deposits, see Dusseau (Onderz. van het Beenweefsel en van Verbeeningen in zachte Deelen, p. 80.)

† A remarkable exemplification is in Mr. Arnott's case. In forty years, the calcified tumour did not more than double its size.

‡ The whole of this process is extremely well described in Mr. Humphry's Lectures on Surgery; Lect. xxvii. p. 139.

smooth muscular tissue, like that of the uterus, extends; namely, to such parts as the utero-rectal and utero-vesical folds, and the broad ligaments.*

Next to the uterus, the nerves are the most frequent seats of fibrous tumours. But of these, while I can refer to the splendid monograph by Dr. Smith,† I will say only that, among the neuromata, the fibrous tumours reach their climax of multiplicity, existing sometimes in every considerable nerve of the body, and amounting to 1200 or more in the same person.‡

So, too, having in view only the general pathology of tumours, and not the study of their local relations or effects, I will but briefly mention the fibrous tumours of bones; referring for a larger account of these to Mr. Stanley's Treatise on the Diseases of the Bones, and to Mr. Cæsar Hawkins's Lectures on their Tumours.§

Leaving these instances of fibrous tumours, the histories of which have been so fully written, I will select, for the general illustration of the whole group, some that are less generally studied; especially those that are found in the subcutaneous tissue, and deeply seated near the periosteum, or other fibrous and tendinous structures.

The *subcutaneous fibrous tumours*, to which those of the submucous tissue closely correspond, pass, as I have already

* It appears, indeed, to be this mixed tissue to which the fibrous tumours particularly attach themselves; for they are in close relation with it in other parts besides the uterus; *e. g.*, in the skin and the submucous tissue of the digestive canal and other parts.

† On Neuroma: folio. Numerous cases are also collected by Moleschott in the Nederlandsch Lancet, Nov. 1845.

‡ M. Lebert has related a case (Comptes Rendus de la Soc. de Biologie, t. i. p. 3) of a woman, 66 years old, who had several hundreds of fibrous tumours in different parts of her subcutaneous tissue. But these do not seem to have been connected with nerves.

§ Medical Gazette, vols. xxi.-ii.-v.

said (p. 107), within sensible gradations into the fibro-cellular. Many may be found that might deserve either name, just as there are many examples of natural tissues with the same intermediate characters; but it is not very rare to find specimens with all the distinctive features ascribed to the fibrous tumours of the uterus. These form firm, nearly hard, and tense, round or oval masses, imbedded, singly or numerously, in the subcutaneous fat, raising and thinning the cutis. They may here attain an immense size, as in a case from the Museum of Mr. Liston.* A tumour, weighing upwards of twelve pounds, was removed from the front of a man's neck, together with a portion of the integuments and platysma that covered it. It was fifteen years in progress, and has an aspect, such as, I think, belongs only to a fibrous tumour. Specimens, however, of this size are very rare; they are commonly removed while less than an inch in diameter.

In microscopic characters the subcutaneous fibrous tumours have the general properties of the species, but they commonly contain elastic tissue, and they are apt, I think, to be lowly developed, having only a fibrous appearance, or even seeming composed of an uniform blastema, with imbedded elongated nuclei, like the material for the formation of new tendons (vol. i. p. 186 and 269).

A peculiar and important character in these fibrous tumours is, that though they may be completely isolated in every other part, they often adhere closely to the lower surface of the cutis, and that, if in any degree irritated, they soon protrude through it, and form vascular masses—"fungous growths," as they are called. When this happens they may bleed profusely, and in a manner which, I believe, is not imitated by any other innocent tumour.

A woman, 52 years old, was under Mr. Stanley's

* Mus. Coll. Surg. 222.

care with a tumour that projected through the integuments in the inner part of the thigh, its base being imbedded deep in the subcutaneous tissue, and its protruding surface raw and ulcerated. The origin of this tumour was uncertain, but it had existed more than nine years; it had grown quickly, and had begun to protrude within two and a half years. From its ulcerated surface hæmorrhage frequently ensued; and the patient stated that at one time two quarts of blood flowed from it. The tumour was excised, and large vessels that entered its base bled freely in the operation. It appeared to be a well-marked specimen of a soft and lowly developed fibrous tumour.

A similar case was under my care in a woman 27 years old. The tumour, of three years' growth, and protruding over the front of the tibia, was similarly ulcerated, and used often to bleed; sometimes it bled largely, and once as much as half a pint of blood flowed from it. This also on removal appeared to be a fibrous tumour.

Through the kindness of Mr. Birkett, I saw a specimen, from a much more formidable example, of the same fact. A woman, 60 years old, had a large pendulous tumour in the front wall of her abdomen, suspended just below the umbilicus, and reaching half-way to her knees. Its surface had a very inflamed appearance, and the separation of a slough from its posterior part gave issue to such hæmorrhage as proved quickly fatal.

The tumour is a large, heavy mass, which was attached to the sheath of the rectus. It is everywhere firm and tough, except where its substance appears to have been broken by blood issuing from numerous large vessels that traverse it. Mr. Birkett, who examined it soon after the patient's death, found its texture certainly fibrous.*

* This specimen was sent to the Museum of Guy's Hospital by Mr. Nason.

The fibrous tumours that occur in or near accumulated fibrous tissues are well exemplified, medically, by some of those of the dura mater, and, surgically, by those which may be found at the tarsus or metatarsus imbedded among the ligaments and other deep-seated parts. Some well-marked specimens are in the Museum of the College. One,* from the collection of Mr. Langstaff, is an oval tumour, six inches long, fixed to the periosteum of the tarsal bones and to the adjacent parts, and filling the sole of the foot from the os calcis to the bases of the first phalanges. It was removed, with the foot, from a nobleman, 35 years old, in whom it had been observed gradually increasing for thirty years. It has all the general aspects of the fibrous tumour, as typified in those of the uterus.

A very similar specimen is shown in a tumour growing over the whole length of the dorsal aspect of the metatarsus;† and with these may be mentioned one‡ which has some historic interest, for it was removed from the Hon. William Wyndham, the associate and friend of Pitt, and Fox, and Burke,— "the model of the true English gentleman." When he was 60 years old, and an invalid, he exerted himself very actively one night in saving from fire the library of a friend. During his exertions he fell, and struck his hip; and from that injury the tumour appeared to derive its origin. It grew quickly, and in ten months it seemed necessary to remove it. Mr. Wyndham submitted to the operation, his biographer says, "with neither hope nor fear;" and it would be difficult to describe so briefly a more unfavourable state of mind. The operation was performed by Mr. Lynn. The tumour was at-

* No. 220. The other half of the same is in the Museum of St. Bartholomew's Hospital, Series xxxv. No. 9.

† Mus. Coll. Surg., 219.

‡ Mus. Coll. Surg., 218.

tached to the capsule of the hip, and was with difficulty removed. At first all went well; but then, it is said, symptomatic fever came on, and death occurred on the 16th day. The tumour was, by Mr. Wyndham's request, placed in the Museum of this College; and I have had it sketched because it might be signalised as one of the most characteristic examples of its kind.

FIG. 13.*

I might add several to these cases, but these may suffice for illustrations of the fibrous tumours connected with the deep-seated fibrous tissues. All the specimens that I have seen have presented the strong white bands intersecting a greyish or dull white basis-substance, the characteristic firmness, heaviness, and tension; all, in microscopic examination, have shown the tough fibrous structure or appearance; all have yielded gelatine in boiling.

The favourite seats of the fibrous tumours of bone and periosteum are about the jaws; on other bones they are very rare. The College-Museum is, I suppose, eminently rich in fibrous tumours connected with the jaws, containing as it does the chief of those that were removed by Mr.

* Fig. 13. Section of a deep-seated fibrous tumour; from the case described in the text. Natural size.

Liston; a series illustrative at once of his admirable dexterity, and of his sound knowledge of pathology.

These tumours of the jaws may, to both touch and sight, present the ordinary characters of the fibrous tumours, as already described. They usually approach the round or oval shape, but are generally knobbed, or superficially lobed, or botryoidal, as some have called them. They are firm, dense, and heavy. On section, however, the majority of them, I think, are more uniform than the fibrous tumours of other parts. They are generally almost

FIG. 14.*

B A

uniformly white, and scarcely intersected by any distinct fibrous bands, except such as may divide them into lobes. Many of them also present, in their interior, minute spicula of compact, white, bony texture.

As to situation and connection, the fibrous tumours of

* Fig. 14, A. Fibrous tumour within the ramus of the lower jaw, disparting and extending its walls. B. A similar tumour outgrowing upon the lower jaw. Both are represented in section, one half of the natural size, from specimens at St. Bartholomew's. Both consisted of perfect and unmixed fibrous tissue.

the jaws may be found isolated and circumscribed, growing within the jaw, divorcing and expanding its walls, and capable of enucleation* (Fig. 14 A); but, in a large number of these tumours, the periosteum, with or without the bone itself, is involved or included in the outgrowing mass (Fig. 14 B). The difference is illustrated by the sketches (Fig. 14). In the case of the upper jaw, either the periosteum, or the fibro-mucous membrane of the antrum or nasal walls, or both of these, may be included in such a tumour. In all cases the tumour lies close upon the bone, and cannot be cleanly or without damage to it separated, except on the outer surface: commonly, indeed, bony growths extend from the involved bone into the tumour; and sometimes the greater part of the bone is as if broken-up in the substance of the tumour.

In all these characters of connection, the fibrous tumours on the exterior of the jaws and about other bones resemble outgrowths: they are as if some limited portion of the periosteum were grown into a tumour overlying or surrounding the bone. The character of outgrowth is indeed generally recognized in the epulis, or tumour of the gums and alveoli; but I believe Mr. Hawkins is quite right in the view which he has expressed, that the fibrous epulis should be regarded as a tumour growing, like most of the other fibrous tumours, from the bone and periosteum, and continuous with them.† That it is prominent and lobed

* For such cases see the Museums of the College and of St. Bartholomew's and Guy's Hospitals; Stanley, Illustrations, pl. 16, fig. 8; Ward, Proc. of the Pathol. Soc. Nov. 16, 1846.

† I say *fibrous epulis*, because growths may be found resembling common epulis in many characters, yet differing in some, and especially in microscopic structure. M. Lebert classes epulis with fibroplastic tumours, and I shall refer in the next lecture to specimens presenting the structure to which he gives that name; but more of

is because it grows into the open cavity of the mouth; and it resembles gum only because it carries with it or involves the natural substance of the gum.

I will refer to but one more set of cases of fibrous tumours; those, namely, that occur in the lobules of the ears. These are, indeed, trivial things in comparison with the tumours of the jaws, yet they have points of interest, in that they grow after injuries, and are very apt to recur after removal. They are penalties attached to the barbarism of ear-rings. Shortly after the lobules of the ears have been pierced, it sometimes happens that considerable pain and swelling supervene. These are apt to be followed by a more defined swelling in the track of the puncture; and this swelling presently becomes a well-marked fibrous tumour in the lobule of the ear. There may be, perhaps, some doubt whether the growth be a proper tumour or a cheloid growth of the cicatrix-tissue formed in the track of the wound; but it has the aspect of a distinct fibrous tumour, and the skin appears unaffected.

In one case, of which the specimens were presented to the Museum of St. Bartholomew's Hospital* by Mr. Holberton, a tumour, such as I have described, formed in the lobule of each ear of a young woman, a few months after they were pierced for ear-rings. Both the lobules were

those which I have examined were of a purely fibrous texture. The difference may be important in surgery; for there is always uncertainty about the operations for epulis; perhaps because among the firm lobed outgrowths from the gums and jaws, to all of which the same name is applied, there are two or more kinds of tumours, with as many different properties. The lecture of Mr. Hawkins (Medical Gazette, vol. xxxvii. p. 1022) is the best study on the subject of epulis. Mr. Birkett tells me he has found the glands of the gum much developed in some instances of tumours thus named.

* Ser. xxxv. No. 24.

cut-off with the tumours; but, in or beneath one of the cicatrices, a similar tumour formed shortly afterwards. This was excised; and in the ten years that have since elapsed there has been no return of the disease.

In another case, under the care of Mr. Benjamin Barrow, two such tumours formed in the same ear after puncture. One of these was cut away, the other was left: a third grew, and the excision of the whole lobule was necessary for the complete extirpation of the disease.

Similar cases are recorded by Bruch,* Venzetta,† and others; but the histories of the cases are so like these that I need not detail them.

Among tumours so diverse in their seats and relations as the fibrous tumours, there are perhaps few things relating to their life that can be stated as generally true.

In the uterus many may exist at the same time: the whole wall of an uterus may be crammed with them, while others project from it into the peritoneal cavity. As Walter and others have observed, when a fibrous tumour fills the cavity of the uterus, or projects from it into the vagina, it is not usual for another to be found in the walls. Such cases do indeed occur, but they are comparatively rare. It is yet much more rare for fibrous tumours to be found in any other part at the same time as in the uterus. I find but one such case recorded; a case by Dr. Sutherland,‡ in which, with several fibrous tumours in the uterus, one was found in the groin of a lunatic 42 years old. But such a case is a most rare exception to the rule; or, indeed, may be more like an example of the rule, if the

* Die Diagnose der bösartigen Geschwülste, p. 208.
† Annales de Chirurgie, Juillet 1844.
‡ Proceedings of the Pathological Society, vol. ii. p. 87.

tumour were connected with the round ligament, and the tissue therein continuous with the uterus.

In the nerves, as in the uterus, a multiplicity of fibrous tumours may be found; but, so far as I know, the rule of singleness generally prevails in every other part liable to be their seat.

The development of fibrous tumours is usually, I believe, through nucleated blastema.

Their growth is generally slow and painless. It is often very slow, so that tumours of thirty or more years' standing are found still far short of the enormous dimensions of some of the last species. But no general rule can be made on this point, especially since the rate of growth is influenced by the resistance offered by the more or less yielding parts around.

The extent of growth appears unlimited; and among the fibrous tumours are the heaviest yet known. They have weighed fifty, sixty, and seventy pounds. The tumour that induced Walter to write his admirable essay* weighed seventy-one pounds. He refers, also, to one of seventy-four pounds, and to one described in an American journal as having been estimated at one hundred pounds; but he asks of this, perhaps impertinently, whether it were weighed also (aber auch gewogen ?).

In relation to the degeneration and diseases of fibrous tumours, I need add nothing to what has been said concerning the formation of cysts, the calcification, and the process of softening or disintegration.

And respecting their nature, there can be no doubt that, in general, they are completely innocent. Yet there seem to be exceptions to this rule; for, occasionally, tumours are found in which both general and microscopic cha-

* Ueber fibröse Körper der Gebärmutter. Dorpat, 4to. 1842.

racters exactly resemble, I believe, the ordinary fibrous tumours already described, but which differ from them in that they recur once or more after removal, and form not only in their first locality, but in internal parts remote from it. To these, till their characters are more perfectly known, I would give the name of MALIGNANT FIBROUS TUMOURS.

A remarkable instance of these occurred in a poor widow who was under my care twelve years ago. She was 47 years old, and had been crippled with acute rheumatism for ten years before she found a small moveable tumour in her right breast. This had increased slowly till seven weeks before I saw her, when, having been struck, it began to grow very rapidly, and became the seat and centre of severe pain. It increased to between two and three inches in diameter, was nearly spherical, very firm, tense, and painful,—even extremely painful. I supposed it to be a large hard cancer, and removed the whole breast. I found the tumour completely separable from the mammary gland, which was pushed aside by it, but was healthy: the cut surface could not, I think, have been distinguished from that of an ordinary fibrous tumour of the uterus, with undulated white bands, except in that part of it had a suffused purplish tinge.* The whole substance of the tumour had the same characters; and in microscopic examination, often and lately repeated, I could find nothing but tough, compact, well-formed fibrous tissue, with imbedded elongated nuclei. On boiling, gelatine was freely yielded. In short, I believe it would be impossible to distinguish, by any means but the history, this tumour from a common unmixed fibrous tumour of the jaw or subcutaneous tissue.

* One section of it is in the Museum of St. Bartholomew's, Ser. xxxiv. No. 24; another in the College-Museum, No. 223.

Three months after the operation a tumour appeared under the scar. It grew very quickly, and felt just like the former tumour. After two months the thin scar began to ulcerate, and the integuments around sloughed; and shortly the whole of this tumour was separated by sloughing, and was removed entire. This also had and, in the Museum of St. Bartholomew's, still retains every character of the common fibrous tumour.

After the separation of this second tumour, a huge cavity remained, with sloughing walls; then, as the sloughs cleared away, hard knots, like those of a cancerous ulcer, grew up from the walls, and the disease assumed all the characters of a vast and deep hard cancerous sore. In two months she died. I found the ulcer nearly a foot in diameter: its walls were formed of a thick nodulated layer of hard, whitish, vascular substance, like the firmest kinds of medullary cancer. Both lungs contained between twenty and thirty small masses of similar substance imbedded or infiltrated in their tissue;* and this substance I have recently again examined, and found to be a complete fibrous tissue, like that of the first tumour removed. I found no similar disease elsewhere.

All the characteristic features of malignant disease were thus superadded to the growth of a tumour which appeared to be, in every structural character, identical with the common innocent fibrous tumour. Nearly the same events were observed in the following case:—In 1835, a man was in St. Bartholomew's Hospital, under the care of Mr. Earle, with a large spheroidal tumour, lying by the base of his scapula, and extending beneath it. It was removed; and I remember that it was easily enucleated from the adjacent parts, and was called "albuminous sarcoma;"

* Mus. St. Bartholomew's, Ser. xiv. No. 43; Mus. Coll. Surg., 224.

but it was not preserved. About a year afterwards the man returned with a yet larger tumour in the same situation. Mr. Skey removed this, together with a large portion of the scapula, to both surfaces of which it was closely united. The wound was scarcely healed, when another tumour appeared, and increased rapidly. With this the patient died, and growths of similar substance, white, very firm, and nodulated, were found beneath that part of the pleura which corresponded with the growth on the exterior of the chest. I state these particulars from memory; but I have found, from repeated recent examinations, that the tumour removed by Mr. Skey is of fibrous texture, resembling the common fibrous tumours both in general and in microscopic characters, and, like them, yielding gelatine when boiled.† It is lobed, with partitions of fibro-cellular tissue, and its several lobes are intersected with obscure opaque white fibres: it is tough, compact, and heavy, and tears with an obscure fibrous grain. It is easily dissected for the microscope, tearing into fasciculi, and appears composed wholly of closely-placed and nearly parallel undulating filaments. A few shrivelled nuclei appear among the fibres, but no cells are distinguishable. Its structure is represented in Fig. 15.

Fig. 15.*

To these cases I may add, though it be an imperfect one,

* Fig. 15, tissue of a malignant fibrous tumour of the scapula: described above. Magnified about 400 times.

† It is in the Museum of St. Bartholomew's, Series xxxv. No. 51.

that of a woman from whose back Mr. Lawrence removed a large, well-marked fibrous tumour, which had grown nine months after one of the same appearance had been removed from the same part.* Before removal, this was judged by all who saw it to be malignant; but it presented a genuine fibrous structure, and could not, I think, be distinguished from an ordinary fibrous tumour.

Such are the cases which make me believe that tumours occur, resembling in all respects of structure and chemical composition the fibrous tumours of the uterus (excepting their muscular fibres), or of the bones or subcutaneous tissue, yet differing from these in that they pursue a course like that of cancers, recurring after removal, growing at the same time in internal organs, tending to sloughing or ulceration, and in the latter process involving adjacent structures. I have related only cases in which the fibrous structure was proved by microscopic examination; but I have little doubt that others might be added from cases of tumours of the jaws and other bones, which have been believed, from their general appearance, to be fibrous, yet have pursued a malignant course. I will only add that these are not such growths as those which Müller and others have named Carcinoma fibrosum, and of which, I believe, that they are always infiltrations in the substance of the affected organs, that they generally include cancer-cells with their fibrous tissue, and that they have in this tissue such hardness, stiffness, and other peculiarities of structure, as make it easily distinguishable from the normal fibrous tissue and its imitation in the fibrous tumours.

* Mus. St. Bartholomew's, Ser. xxxv. 52.

LECTURE VI.

RECURRING FIBROID AND FIBRO-NUCLEATED TUMOURS.

The two groups of tumours, of which I propose to speak in this lecture, have perhaps no near affinity to the fibrous tumours last described; yet they resemble them in general aspect; they have, till within the last few years, been confounded with them; and their component structures resemble those that are rudimental of the fibrous tissue. There will, therefore, be some practical advantage in making the real contrast between them appear, by proximity, more striking.

I have proposed the name "Recurring Fibroid Tumour" for a group of which the chief characteristics are that their general aspect very closely resembles that of the common fibrous tumours; their microscopic structure consists of corpuscles caudate and elongated, as if developing into fibres; and the most striking feature in their history is their proneness to return after removal.

A brief account of some cases of this tumour may best illustrate it.

The first I saw was from a gentleman, 60 years old, under the care of Mr. Stanley. In 1846 a tumour was removed by Mr. Cockle from the upper and outer part of his leg. It lay close to the tibia, was as large as a filbert, and was considered fibrous. Some months afterwards another tumour was found in the same place, and, when as large as a walnut, was removed by Mr. Hamilton, of the London Hospital, who considered it "decidedly fibrous." In October, 1847, Mr. Stanley removed from the same place a third tumour; and this I examined minutely. It had the shape, and nearly the size, of a patella; and the note that I made of its general appearance was, that it was "very like those fibrous tumours which are whitest, most homogeneous, and least fasciculate and glistening;" and that "without the microscope I should certainly have called it a fibrous tumour."

The microscopic examination, however, showed peculiar structures (Fig. 16). The tumour was composed almost

FIG. 16.*

entirely of very narrow, elongated, caudate, and oat-shaped nucleated cells, many of which had long and subdivided terminal processes. Their contents were dimly shaded; and in many instances the nuclei appeared to swell out the body of the cell, as in the most elongated granulation-cells. With these cells were scattered free nuclei, and grumous or granular matter, such as might have been derived from disintegrated cells. Very little filamentous tissue was contained in any part of the tumour.

Now, in the extirpation of the third tumour, the parts

* Fig. 16, microscopic elements of a recurring fibroid tumour described above. Magnified about 400 times.

around it were very freely removed, the periosteum was scraped from the tibia, and every assurance seemed to exist that the whole disease was cleared away. But, in June 1848, two small tumours appeared in the subcutaneous tissue, just below the seats of the former operations. These also were removed, and these had the same fibrous appearance, and the same minute texture, as the preceding. Some months only elapsed before in the same place another tumour grew; *i. e.* a sixth tumour. The patient, despairing of remedy by operations, allowed this to grow till November 1850, by which time it had acquired a diameter of between four and five inches, and protruded as a large soft fungoid mass from the front of the leg. Two profuse hæmorrhages occurred from it, and made him earnestly beg that his limb might be removed to relieve him from the extreme misery of his disease. The amputation was performed, and he died in a few days.

The tumour* appeared confused with the thin skin over it. It rested below on the muscles of the leg, but was not mixed with them except at a scar from the former operations. The tumour was milk-white, soft, and brain-like, except where discoloured by effused blood, and in the exposed parts was soft, pulpy, and grumous. One would certainly, judging by its general aspect, have called this a brain-like medullary cancer; and yet it had essentially the same microscopic characters as the tumours I first examined from the same patient: only, the narrow, elongated, caudate cells were very generally filled with minute shining molecules, as if from fatty degeneration connected with the protrusion and partial sloughing of the mass. Unfortunately no examination of the body was made after death, and it could only be guessed, from the

* In the Museum of St. Bartholomew's.

absence of emaciation, and of all other indication of general loss of health, that no similar disease existed in internal organs.

In another case of the same kind, I assisted Mr. Stanley, in May 1848, in the removal of a tumour from the shoulder of a gentleman 28 years old. It had been growing under the deltoid for six months, was loosely connected with the surrounding parts, and was about three inches in diameter. It had the general aspect of a common fibrous tumour: firm, tough, white, traversed with irregular bands. It was easily and completely removed, but was not examined with the microscope. The wound of the operation healed well; but, two months afterwards, a second tumour appeared under the cicatrix. This was removed with some of the adjacent muscles, and other tissues. It was like the first, only less tough, and more lobed, and elastic; but under the microscope, instead of appearing fibrous, it was found to be composed almost entirely of elongated and caudate nucleated cells, very like those described in the last case, and mixed with free nuclei, and granular matter.

In March 1849, a third tumour was removed from the same part, which had been noticed two months, and again presented the same character; it was indeed greyer, and less firm, and more shining and succulent on its cut surfaces, but the differences to the naked eye were not great, and the microscopic structure was the very same as in the former instance.

In October 1849, another tumour had formed, and after it had resisted various methods of treatment, Mr. Stanley removed it, by a fourth operation, in December. This had again the same character.

In the course of 1850, a fifth tumour appeared in the same part, and this, after growing slowly for an uncertain time, ceased to increase, and has now been for a long time stationary, without in any way interfering with the patient's health. He is pursuing an active occupation, and, but for the tumour, might be thought a healthy man.

In a third case, Mr. Syme removed, in 1839, a tumour which, without any known cause, had been growing for a year, over the anterior part of the first right rib of a gentleman 48 years old. Two years after the operation, another tumour appeared in or near the same part, and was removed, by Mr. Syme, in 1843. A third was removed by him in 1847; and a fourth in 1849. After another distinct interval of apparent health, a fifth tumour appeared, and grew quickly, and was removed by the same gentleman in 1851. In one of these, an account of which was published by Mr. Syme, Dr. Hughes Bennett found microscopic structures similar to those of the fibro-plastic tumours of Lebert;* similar, therefore, I have no doubt, to those described above. The patient recovered from the last operation, as from all the previous ones, quickly and favourably; but the wound had scarcely healed when two more tumours appeared beneath the scar, like the preceding ones, except in that they grew more rapidly.

One of these tumours was so firmly fixed at the clavicle that no further operation could be recommended. In six months' growth the tumours, at first distinct, had formed a single mass, deeply lobed, of oval form, measuring a foot in one direction, and about ten inches in the other. It covered, and felt as if tightly fixed to, the middle half of the clavicle, and thence extended downwards over the chest, and outwards towards the axilla. It felt heavy, firm, tense,

* Monthly Journal of Medical Science, vol. x. p. 194. Probably this refers to the elongated cells alone. I have not, in any of these tumours, found the large many-nucleated cells which occur in most of the tumours named fibro-plastic by M. Lebert.

and elastic. The skin, thinly stretched over it, and by its tension appearing as if adherent, was generally florid, but in some parts livid, and over the most prominent lobes ulcerated; but the principal ulcers were superficial, covered with healthy-looking granulations, discharging thick pus, having no cancerous or other specific character: only one of them had a thin slough. Such were the characters of the disease when I saw it in February 1852; and it was very striking, as evincing one of the contrasts between this form of tumour and any rapidly-growing ulcerated cancer, that the patient's general health was scarcely affected. He was still a florid sturdy man; and he fed, slept, talked, and moved about as a man in health might do. He suffered scarcely any pain; but, within the last month, the ulcerated surface of the tumour had bled severely. The tumour was now submitted to compression, with Dr. Neil Arnott's apparatus; and with some advantage, inasmuch as its growth was retarded, and the hæmorrhage was prevented, so long as the pressure was maintained. Twice, however, on the instant of removing the apparatus, I saw arteries, as large as the radial, throw blood in a jet far from the trunk. The bleeding was in this respect such as I have never seen from the proper vessels of any other tumour, and was like that described as occurring in the first of these cases.

It would be useless to tell, at any length, the later history of this case. The tumour increased constantly to the time of the patient's death in July 1852; but, in the last two months, several small portions of it sloughed away, and it gradually shifted lower down on the chest, leaving the clavicular region, so that at the time of death it lay moveable on the muscles, and could be removed, "as a common fatty tumour might be," without dividing any important part: death seemed due to mere exhaustion, consequent on the discharge from the tumour, and the pain to which, as it extended further into the axilla, it gave rise. Dr. Ross, to whom I am indebted for an account of the conclusion of the case, could find no indication of disease in any internal organ. Only the tumour was allowed to be examined after death; and Dr. Ross wrote to me of it, in addition to the account of the absence of any deep connection or infiltration of adjacent tissues, that "its texture was pretty hard, like that of a fibrous tumour, but not nearly so dense or crisp as scirrhus. It scarcely gave out any blood on being cut into; but here and there was to be seen, on the surface of a section, the open mouth of a vessel, just as in a section of liver. All the textures behind, forming the bed of the tumour, appeared quite healthy."

FIG. 17.*

A portion of the tumour, kindly sent to me by Dr. Ross, was, after having lain in spirit, milk-white, firm, elastic, of very close texture, breaking and tearing with a coarse fibrous grain. It had, most nearly, the aspect of a very firm fibro-cellular tumour altered by spirit. When scraped it yielded little or no fluid, but white shreds, in which, together with much that looked like withered tissue or débris, there were abundant slender awn-shaped corpuscles, such as are sketched in Fig 17. They looked

* Fig. 17, microscopic structures of the recurring fibroid tumour described above. Magnified 450 times.

dry and shrivelled, containing no distinct nuclei, but minute shining particles, as if themselves were outgrown nuclei. With these, also, were numerous broader and shorter corpuscles, of the same general aspect, but enclosing oval nuclei; and yet more numerous smaller bodies, like shrivelled, oval, elongated, free nuclei, dotted, and containing minute shining particles. The whole mass appeared made-up of corpuscles of these various shapes, irregularly or lineally imbedded in a substance that was nearly structureless or imperfectly fibrillated. Only in a few places, perhaps in the partitions of the lobes, there was a very small quantity of fine fibro-cellular tissue.

I think there can be no doubt that this case was essentially of the same kind as the former two; and the constancy of their peculiarities in both history and structure appears sufficient to justify the placing them in a separate group and under a separate title. But these are not the only cases to be cited.

Prof. Gluge has given a good general account of the history of such tumours as these, as examples of the forms transitional to cancer. He names them "albuminous sarcoma;" a term one hears frequently used, without, perhaps, any clear meaning; yet generally, I think, with the suspicion that the growths to which it is applied are not wholly innocent. Among the cases which he cites, one coincides exactly with those I have detailed. A major, 45 years old, fell from his horse, in 1843. Six or seven weeks afterwards, a tumour appeared over his scapula. It was removed, but after some months returned. Between 1843 and 1848, four such tumours were removed from the same part. In 1848, the patient was under the care of M. Seutin, who removed the fifth tumour; and Gluge's description of this, including the expression that in colour and consistence it was like the muscular tissue of the intestinal canal, leaves little doubt that it was like the less firm of the specimens that I have been describing. In the last of these five operations, and in one previously, the removal of the tumour was followed by free cauterization of the wound; yet the last account published by Professor Gluge was, that in April, 1849, a sixth tumour had appeared in the same part; and he has informed me by letter that in 1850 the patient died.

Lastly, a case which, in its conclusion, is the most instructive of all that have been recorded, is related by Dr. Douglas Maclagan.*

A girl, 22 years old, had a tumour, of three years' growth, on the left lumbar region, about an inch from the spine. In 1832, it was about as large as a Jargonelle pear, firm, but elastic and moveable, and below it was a portion of indurated skin. The tumour and diseased skin were removed, and the former "possessed most of the characters of a simple fibrous tumour." After about twelve months the disease returned in the scar. Three little tumours formed, and these, with the scar, were removed freely, in February 1834. "The extirpated mass bore a striking resemblance to that previously removed." Between twelve and eighteen months later, a third growth appeared, which, after increasing for a year and a half, was removed. "It had the same elastic feel and fibrous appearance; and the semi-transparent pinkish grey colour was the same as in the original tumour." After this operation no fresh growth ensued; and Dr. Maclagan informed me, in 1850, that the patient remained perfectly well. The portraits of the several tumours, which he very kindly sent me, make me sure that the disease was, in this case, the same as in those I have before detailed.

* Edinburgh Medical and Surgical Journal, vol. xlviii.

Dr. Maclagan has added the account of another case in which the essential features were quite similar; and another, which I believe must be referred to this group, is accurately described and figured by Dr. Hughes Bennett.*

These cases will suffice to prove the existence of a group of tumours having these remarkable characters in common:—1st. A general resemblance to the fibrous tumours in their obvious characters; 2d. A microscopic texture composed, essentially, of elongated and caudate or oat-shaped cells, somewhat resembling the elongated cells of granulations or of lymph developing into fibres, yet differing from them enough to be easily distinguished; 3d. An exceeding tendency to local recurrrence after removal, and, in the worst extremity, to protrusion and ulceration; 4th. An absence of those events which, in cases of ordinary malignant growths, would coincide with local recurrence: such as cachexia, independent of profuse suppuration, pain, and other ordinary causes of exhaustion; and the absence of all affection of distant parts, or of the lymphatics. 5. Occasionally, a cessation of the tendency to recurrence, and a complete recovery.

How may we interpret this singular proneness to recur; this tendency which by its existence separates these to some distance from all innocent tumours, and by its existing alone separates them as far from the malignant tumours?

Two views may be taken of the fact.† The tumours

* On Cancerous and Cancroid Growths, p. 87.

† Some would add a third, supposing that in all these cases portions of the tumour were left behind in the operations. But this is unreasonable. These tumours are not more difficult to remove wholly than many are which never thus recur, such as the fatty, fibro-cellular, and the like. Besides, in the cases I have cited, the names of the operators are a sufficient guarantee that the whole tumour was every time removed.

may, from the first, be formed in a cluster or group, and then the removal of one of them only leaves the remainder to continue their growth; or, 2dly, the apparent recurrence may be a real one, such as we suppose occurs in the case of cancers; in which we presume that, in a first operation, every morbid structure already formed in a part is removed, and entirely new growths are produced in the same part.

The former view is supported by whatever of resemblance exists between these and fibrous tumours, whose proneness to multiplicity is remarkable; and by the fact that sometimes, after the removal of one of these, two, or a more numerous group, have appeared in the same part. Yet the objections to this view appear to me more weighty. If we suppose, in any case in which six or seven tumours have been removed in succession from the same part, in as many years, that all began to grow at or about the same time, the last of these ought, according to the rate of growth of the rest, to have come into view much sooner. If the second tumour were not discernible in the first operation, where, or of what size, was the sixth? or why did this sixth require many years to attain the same bulk as the supposed coeval second tumour acquired in one year? It may be added that some of these fibroid tumours appear to have recurred in the substance of a scar left after a former operation; in a tissue, therefore, which did not exist at the time of the previous operations.

We must not overlook, in connection with this apparent aptness to recur, the fact that the later-formed of these tumours may assume more of the characters of thoroughly malignant growths than were observed in the earlier. In the first case I have related, the last tumour was, in general aspect, hardly to be distinguished from brain-like tumour, though, in microscopic characters, essentially like its predecessors. In one of Professor Gluge's cases, the transitions to completely malignant characters appeared yet more sure. Mr. Syme also expresses a similar transition; describing, as the usual course of the cases he has seen, that, after one or two recurrences of the tumour, the next new productions present a degeneration of character, excite pain, proceed to fungous ulceration, and thus in the end prove fatal. And in all cases, unless recovery ensue, the successive tumours increase in rate of growth. So that, although there be cases in which this evil career has not been run, yet I think we may regard these tumours as approximating to characters of malignancy, not only in their proneness to recur after removal, but in their aptness to assume more malignant features the more often they recur. Whatever be the truth concerning the supposed transformation of an innocent into a malignant morbid growth, I think it can hardly be doubted that, in the cases of some recurring growths, such as these, and certain recurring proliferous cysts, the successively later growths acquire more and more of the characters of thoroughly malignant disease.*

Fibro-nucleated Tumours.

Dr. Hughes Bennett† has given the name of ***Fibro-nucleated*** to certain tumours, first described by himself, of which I think that future investigations will prove a very near affinity with those which I have been considering. They are, indeed, of so rare occurrence, that we cannot as yet be sure of many things concerning them; but their most usual

* See a reference to the same point at p. 76. An illustration is presented by a remarkable case, of which specimens are described in the Catalogue of the Museum of St. Bartholomew's, Ser. xxxv. Nos. 28, 29.

† On Cancerous and Cancroid Growths, p. 176, &c.

characters seem to be, as assigned by Dr. Bennett, a general resemblance to the fibrous tumours; a tendency to return in the part from which one has been excised; an absence of disposition to affect lymphatics or more distant parts; and a texture "consisting of filaments infiltrated with oval nuclei." The first three characters are repetitions of those belonging to the recurring fibroid tumours; the last is not so; and yet the difference of structure is such as may consist with a very near natural relationship. For, as we have seen, both cells tending to elongate and attenuate themselves into filaments, and nuclei imbedded in a simple or filamentous blastema, are equally forms through which fibro-cellular or fibrous tissue may be developed (see p. 119, &c.) And thus it may be that, in these two groups of tumours, the similarly contrasted forms of elemental structure may be nearly related, in that both alike represent persistently imperfect developments of fibrous masses.

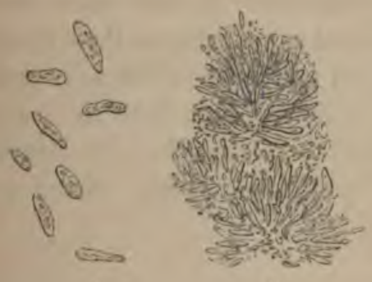
However this may be, the history of these cases is important, especially because, like the last described, they seem to occupy a kind of middle ground between innocent and malignant tumours. They are among the diseases which are often spoken of as "semi-malignant," "locally malignant," or "less malignant than cancer:" terms which are generally used in relation to what are deemed exceptional cases, but which may appear to have a real meaning if ever we can apply them to well-defined groups of tumours.

The most characteristic of the cases described by Dr. Hughes Bennett was that of a lady 25 years old, from whom, when she was 18, a tumour of four years' growth was removed from the left thigh, nearly in front of the great trochanter. After its removal there remained a small hard knot in the scar; but no change ensued in this for six years. Then it began to enlarge and increase, and in a year increased to the size of a small almond-nut. It was super ficial, quite moveable, and intimately adherent to the skin. It was hard and dense; and its cut surface was smooth, slightly yellowish, and yielded no juice on pressure. It appeared to consist of fine filaments among which oval bodies, like nuclei with nucleoli, were everywhere infiltrated. Here and there large oval rings appeared, marked by converging irregular lines, and, in a few places, oval spaces surrounded with concentric marks, like sections of gland-ducts.

The only well-marked case that I have yet seen was that of a boy, 10 years old, on the palmar aspect of whose fore-arm a small indentation was noticed at birth. This part was slightly wounded when he was two years old, and from that time a tumour began to grow. When he was four, the tumour was removed (of course completely) by Mr. Sands Cox, but the wound did not heal before another growth appeared. This increased at first slowly, but at last quickly; and when the boy came under my care, it formed an oval swelling rising to nearly an inch and a half above the surrounding skin, and measuring from three to three and a half inches in its diameters. The skin over it was very thin, adherent, tense, and florid, and at the centre ulcerated, and superficially scabbed; the ulcerated surface was granulated, like one slowly healing. The mass felt firm and elastic, and, at its borders, very tough, like the tissue of a cicatrix; little cord-like branching processes extended from its borders outwards in the deeper substance of the cutis; and above the principal mass another, like a small flattened induration of the skin, was felt. The growth was not painful, and the general health appeared good. Some axillary glands were slightly enlarged.

I removed the whole disease, with all the surrounding skin that appeared in any way unhealthy, and large portions of the fascia of the fore-arm and of the intermuscular septa, to which the base of the growth adhered intimately, and which were indurated and thickened. The wound very slowly healed; the enlargement of the axillary glands subsided; and I have heard from Mr. Oliver Pemberton, under whose care the recovery ensued, that the patient remained quite well fifteen months after the operation.

FIG. 18.*



The tumour was intimately adherent to all the parts adjacent to it, yet was distinct and separable from them. Its section was smooth and shining, of stone-grey colour shaded with yellowish tints. It was lobed; but in its several lobes was uniform, and with no appearance of fibrous or other structure; but intersected irregularly by white and buff-yellow branching lines, where the microscope found a fatty degeneration of the tissue. In texture the tumour was firm, but easily breaking and splitting in layers, shell-like: with the microscope it appeared to be composed of two materials; namely, nuclei, and a sparing granular or molecular substance in which they were imbedded. These, as sketched in Fig. 17, were so like those represented by Dr. Bennett, as to leave little doubt of the similarity of the two cases; only there was here less appearance of fibrous structure, and less of a texture like that of glands. The nuclei were, generally, of regular elongated oval shape, from $\frac{1}{1500}$ to $\frac{1}{2400}$ of an inch in

* Fig. 18, A, nuclei; B, nucleated structure of the tumour described above. A magnified 450 times; B about 250 times.

length, and generally bi-nucleolated; comparatively few were broader, or reniform, or irregular. They were very thick-set in a molecular basis-substance, and in many parts (perhaps in all that were not disturbed) they appeared as if arranged in overlying double or triple rows, which radiated to a distance from some point, or from some space of round or elongated oval form. These spaces, if they were such, appeared full of molecular matter.

It would be wrong to endeavour to draw many conclusions from so small experience as yet exists on these tumours. I will only express or repeat my belief (which fully concurs with what Dr. Bennett has stated) that these are examples of a form of tumour different from any others yet classified; and that they will be found most nearly related to the recurring fibroid tumours.

LECTURE VII.

CARTILAGINOUS TUMOURS.

THE name of Cartilaginous Tumours may be given to those which Müller, in one of the most elaborate portions of his work on Cancer, has named Enchondroma.* Either term will sufficiently imply that the growth is formed, mainly, of a tissue like cartilage; and I would at once point out the singularity of such tumours being formed, and growing to so great a size as I shall have to describe, although cartilage is not commonly formed for the repair of its own injuries, nor, at least in man, in a perfect manner, for the repair of the injuries of bone.

The cartilaginous tumours are found, in the large majority of cases, connected with the bones and joints.† However,

* Other names employed are Osteo-chondroma, Chondroma, Benign Osteo-sarcoma. The term osteo-sarcoma cannot be too entirely disused; it has been more vague than even Sarcoma, having been employed indiscriminately for all tumours, of whatever nature, growing in or upon bones, provided only they were not entirely osseous.

† Those referred to as connected with the joints are the cartilaginous masses that are found pendulous or loose in joints. They have sufficient characters in common with these tumours to justify their enumeration in the list; yet they are in so many respects peculiar, that they need and usually receive a separate history. The best account of them, and of their probable origin in the villi of synovial fringes, may be gathered from Bidder, in Henle and Pfeufer's Zeitschr. B. iii.; Rainey, in Proc. Pathol. Soc. ii. p. 140; and Kölliker, Mikrosk. Anat. ii. p. 324.

they occur not rarely in soft parts, completely detached from bone. Thus, in the pure form, or mixed with other tissues, they are met with in the testicle,* mammary gland,† subcutaneous tissue,‡ and lungs,§ and in the soft parts near bones; but among all the soft parts their favourite seat appears to be the neighbourhood of the parotid gland. The greater part of the solid tumours formed in this part have cartilage in them.

Cartilaginous tumours that are connected with bones may, like fibrous tumours (p. 146, fig. 14), occur in two distinct positions; namely, within the walls, or between the walls and the periosteum: rarely they grow in both these positions at once. When they are within the bones, they are isolated and discontinuous, and are surrounded by the bone-walls, which may be extended in a thin shell or capsule around them, or may be wasted and perforated by them. When they grow outside the bones, they are generally fastened to the subjacent bone-wall by outgrowths of new bone; the periosteum, greatly overgrown, invests them, and prolongations from it towards the bone appear to intersect them, and divide them into lobes. When they grow among soft parts, they have a well-formed fibro-cellular or tougher fibrous capsule, which is commonly more dry and glistening than that of most innocent tumours.

* Mus. Coll. Surg., Nos. 2384-5-6, &c.; Mus. St. Bartholomew's Hosp. Ser. xxviii. No. 17, and Appendix; and several in the Museum of St. Thomas's Hospital. See also Mr. Gamjee's pamphlet, on a Case of Ossifying Enchondroma in the Testicle of a Horse.

† Astley Cooper, Diseases of the Breast, p. 64; Müller, On Cancer, p. 149, No. 13, from a dog; Mus. St. Bartholomew's, Ser. xxxiv. No. 13, from a bitch.

‡ Rokitansky, Pathol. Anat., B. i. p. 261; Lebert, Abhandlungen, p. 195.

§ Mus. St. Bartholomew's, Pathol. Appendix; Rokitansky and Lebert, l. c.

In any of these situations, cartilaginous tumours may be either simple or complex, conglobate or conglomerate, if we may adopt such terms; *i. e.*, they may be composed of a single mass without visible partitions, or, of numerous masses or knots clustered, and held together by their several investments of fibro-cellular tissue. According to these conditions they present a less or more knotted or knobbed surface; but in either state they affect the broadly oval or spheroidal shape, (fig. 28).

To the touch, cartilaginous tumours may be very firm or hard, especially when they are not nodular and their bases are ossified. In other cases, though firm, they are compressible, and extremely elastic, feeling like thick-walled tensely-filled sacs. Many a solid cartilaginous tumour has been punctured in the expectation that it would prove to be a cyst.

The knife cuts them crisply and smoothly; and their cut surfaces present, in the best examples, the characters of fœtal cartilage; bright, translucent, greyish, or bluish, or pinkish-white, compact, uniform. Usually, each separate mass or lobe is without appearance of fibrous or other compound structure; but, sometimes, the cartilage looks coarsely granular, as if it were made up of clustered granules. This is, I think, especially the case in the cartilaginous tumours inclosed in the bones of the hands and fingers; especially in such of them as are soft. In other cases, when the cartilage is very firm, it may be opaque or milk-white.

In different examples of cartilaginous tumour there are great varieties of consistence or firmness. Some appear almost diffluent, or like vitreous humour; some are like the firmest fœtal cartilage; and all intermediate gradations may be found: but, with the exception of the cartilaginous growths that are pendulous or loose in joints, I have never seen any present such hardness, dulness, or yellowness, as do the natural adult cartilages of the joints, ribs, or larynx.

As, in all general appearance, the material of these tumours, in its usual and most normal conditions, is identical with fœtal cartilage, so is it, I believe, in its development, and, as Müller has shown, in its chemical characters.* The microscopic characters, also, of cartilaginous tumours agree, speaking generally, with those of fœtal cartilage; yet there are several particulars to be observed concerning them, and, especially, the diversity of form and arrangement, that may be seen in the microscopic constituents of even different parts of the same tumour needs mention.

This diversity of microscopic forms is enough to baffle any attempt to describe them briefly, or to associate them with any corresponding external characters in the tumours. The most diverse forms may even be seen side by side in the field of the microscope. But this diversity is important. It has its parallel, so far as I know, in no other innocent tumour; and the cartilaginous tumours form perhaps the single exception to a very generally true rule enunciated by Bruch†; namely, that it is a characteristic of the cancerous tumours, and a distinction between them and others, that they present, even in one part, a multiformity of elementary shapes.

The diversity of microscopic characters extends to every constituent structure of the cartilage in the tumours. I will state the general and chief results of the examinations of fifteen of the recent specimens,‡ of which I have made notes, and the drawings from which the annexed figures were copied.

* The enchondromata of bones, he says, always yield chondrine; while those of soft parts may yield either gelatine or chondrine (On Cancer, p. 124). The whole account of their analysis is very amply given by him.

† Die Diagnose der bösartige Geschwülste.

‡ These are exclusive of specimens of loose cartilages in joints; of which, indeed, no account will be given in this lecture.

(1) In regard, then, to the basis or intercellular substance:—It is variable in quantity, the cells or nuclei in some specimens lying wide apart (Fig. 19), in some closely crowded (Fig. 21, &c.): it varies in consistence, with all the gradations to which I have already referred: and in texture,—in some specimens, it is pellucid, hyaline, scarcely visible; in some, dim, like glass breathed-on; in many more, it is fibrous in texture or in appearance (Fig. 19, 20). Most cartilaginous tumours, indeed, might deserve to be called fibro-cartilaginous. It is seldom, and, I think, only in the firmest parts or specimens, that the substance between the cartilage-cells has the strong hard-lined fibrous texture which belongs to the chief natural fibrous cartilages; yet it has generally a fibrous texture. The

Fig. 19.*

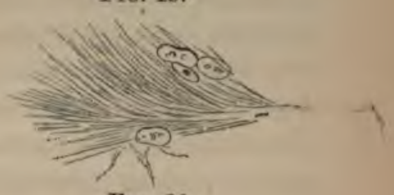


Fig. 20.

Fig. 21.

Fig. 22.

* Fig. 19. Tufted, pale, filamentous tissue, with a few imbedded cartilage-cells. From a tumour over the parotid gland.

Fig. 20. Stronger and denser fibro-cartilaginous tissue; many of the cartilaginous cells having granulated nuclei. From a tumour over the parotid gland, magnified 400 times.

Fig. 21. Groups of cartilage-cells, clustered in a portion of a tumour on the phalanx of a finger. Many of the cells are only drawn

fibres are, or appear, usually soft, nearly pellucid, and very delicate; sometimes they appear tufted or fasciculate (fig. 19); sometimes they encircle spaces that contain each a large cartilage-cell, or a cluster of cells or nuclei (fig. 21); sometimes they form a fasciculated tissue in which cartilage-cells lie elongated and imbedded (fig. 20): most commonly of all, I think, they curve among the cells, as if they were derived from a fibrous transformation of an intercellular hyaline substance (fig. 23.)

(2) Yet greater varieties may be found in the characters of the cartilage-cells.* In plan of arrangement they may be irregularly and widely scattered, or closely placed, or

in outline; the groups are intersected by bands of tough fibrous tissue; some of the cells present double or triple contour-lines; most of the nuclei are large and granular. Magnified about 400 times.

Fig. 22. A group of large cartilage-cells from the same; many containing two or three nuclei, of which some have acquired the character of enclosed cells.

Fig. 23. Group of cartilage-cells from a tumour in the tibia. Fine filamentous tissue encircles, and intervenes between, single-cells. Some of the nuclei of the cells contain oil-particles; and some of the same (in fig. 23,A) show, apparently, the process of assuming the stellate or branched form. Magnified 400 times.

Fig. 24. Free nuclei: some simple, and some enlarged, and variously beset with branching processes. From a cartilaginous tumour under the angle of the lower jaw. Magnified 400 times.

Fig. 25. Similar nuclei variously distorted and shrivelled. From a mixed cartilaginous tumour over the parotid; similarly magnified.

* I retain this name, although the observations of Bergmann (De Cartilaginibus, 1850) and others show that it is difficult, in some cases, to determine the nature of the cell-contents, and that their nuclei may be more like cells, or, having had the characters and relations of nuclei, may acquire those of included nucleated-cells. Taking, as the type of cartilage-*cells*, the elements of the chorda dorsalis, I think we shall least often err if we keep the term *cell* for those elementary structures in other cartilages which are most like the cells of the chorda, in their fine clear outline, and the pellucid or dim space just within, or, also, just without it.

almost regularly clustered with fibrous tissue encircling them (Fig. 19, 21, 22). In single cells there are varieties of size from $\frac{1}{700}$th to $\frac{1}{1800}$th of an inch. And there are yet more varieties of shape; some have the typical form of healthy preparatory cartilage-cells, being large, round, or oval, or variously shaped through mutual pressure, faintly outlined, with single nuclei, and clear contents (Fig. 23); and some are like normal compound cartilage-cells (Fig. 22). But, with various deviations from these more normal characters, some cells have hard dark outlines; and some are bounded by two, three, or four dotted or marked concentric circles, as if the cell-walls had become laminated (fig. 21, 22); others appear without any defined cell-walls, as if they were mere cavities hollowed out in the basis-substance; and, in other instances, the

FIG. 23.

FIG. 23A.

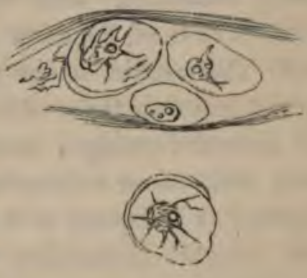


FIG. 24.

FIG. 25.

cell-walls and their contents, down to the nucleus, appear as if they were completely fused with the basis-substance, so that the nuclei alone appear to be imbedded in the hyaline or dimly fibrous material. These last two states appear to be connected with very imperfect development or with degegeneration; for I have seen them, I think, in only soft cartilage, or in such as showed other distinct signs of degeneration. In many such cases, also, the nuclei are so loosely connected with the basis-substance, that large numbers of them float free in the field of the microscope.

(3) The varieties of the nuclei in the cartilage of tumours are not less than those of the cells. Some are like those of the normal cartilage; round or oval, clear, distinctly outlined, with one or two nucleoli (fig. 22). But some appear wrinkled or collapsed, as if shrivelled; some contain numerous minute oil-particles, representing all the stages to complete fatty degeneration, and the formation of granular bodies (fig. 23, 20); some are uniformly but palely granular, like large pale corpuscles of lymph or blood; some are yet larger, nearly filling the cells, pellucid, like large clear vesicles with one or more oil-particles enclosed; and some have irregularities of outline, which are the first in a series of gradational forms, at the other extremity of which are various stellate, branched, or spicate corpuscles (fig. 23A, 24, 25).

I have not been able to discern any constant rule of coincidence between these forms of nuclei and the various forms of cells, nor between either and any of the enumerated appearances of the intercellular or basis-substance. All modes of combinations have appeared among them; only, on the whole, the completely developed cells have the best nuclei, and the degenerate or imperfect of both are usually in company.

The last named nuclei, with irregular outlines, deserve a more particular description, both because they are, so far as

I know, found in no normal cartilage in any of the vertebrata, and because their imitating, in some measure, the forms of bone-corpuscles might wrongly suggest that they have a constant relation to the ossifying process.

They were first described, I think, by Müller; and have since been noticed in cartilaginous tumours by Mr. Quekett, and many others. I have examined them in seven cases; and, to show that they are not peculiar to one form of cartilaginous tumour, I may add that, of these seven, one was a great tumour encircling the upper part of the tibia, one a growth on the last phalanx of the great toe, one a mixed tumour in the articular end of the fibula, one a very soft tumour in the subcutaneous tissue on the chest, and three were mixed tumours over the parotid or submaxillary gland.

The phases of the transformation by which they are produced appear to be, as represented in Fig. 23A-4-5, that a nucleus of ordinary form, or with one or more oil-particles, enlarges and extends itself in one or several slender, hollow, and crooked processes, which diverge, and sometimes branch as they diverge, towards the circumference of the cell. Such nuclei may be found within the cells (fig. 23A), or within cavities representing cells whose walls are fused with the intercellular substance; but much more commonly it appears as if, while the nuclei changed their forms, the cells and the rest of their contents were completely fused with the intercellular or basis-substance, so that the nuclei alone appear imbedded in the hyaline or pale fibrous subtance. The nuclei thus enlarged may appear like cells, and their nucleoli may be like nuclei. But although, at first, as we may suppose, the nuclei, as they send out their processes, may enlarge and retain the round or oval form of their central parts or bodies, yet they afterwards lengthen and attenuate themselves, so as to imitate very closely the shapes of large bone-corpuscles or lacunæ; or they elongate and branch, or shrivel up; and in these states, lying in groups, they have the most fantastic appearances (fig. 24, 25). In these various states the nuclei are often loosely connected with the basis-substance; so that they are easily removed from it, or are found floating on the field of the microscope, as nearly all those were which are here drawn.

Now, as I have said, corpuscles like these exist permanently in no normal cartilage yet examined, in man or any of the vertebrata.* If, then, heterology of structure were indicative of malignancy, the tumours that contain these corpuscles should be malignant; but there are no facts to make it probable that they are so; and every presumption is in favour of their being innocent.

As to the meaning of these changes of the nucleus;—they may be, as Mr. Quekett† has shown, preparatory to ossification, and the metamorphosis of the cartilage-nucleus into a bone-corpuscle or lacuna; but in many instances they are unconnected with ossification: for, in most of the cases in which I have found them, the tumour was in no part ossified, and in many of them it was not of a kind in which ossification was likely to ensue. In these cases we may believe the change of the nuclei to be connected with a process of degeneration. There are many grounds for this; such as the fact, already mentioned, of their likeness to the nuclei of lower cartilages; their likeness in shape to ramified pigment-cells and bone-corpuscles, which have probably lost all power for their own nutrition; the frequent coincidence of more or less fatty degeneration in the nuclei thus changing; the usual coin-

* The only natural cartilage yet known as possessing these corpuscles is, I believe, that of the cuttle-fish (Quekett, in Histol. Catal. of Coll. of Surg. Pl. vi. fig. 7); and it is at least interesting, and may be importantly suggestive, to observe that the morbid structure, deviating from what is natural in its own species, conforms with that of a much lower creature.

† Lectures on Histology, p. 166.

cidence of the fusion of the cell-wall and contents with the basis-substance of the cartilage, and the loosening of the nuclei; and the gradual shrivelling or wasting of the nuclei after the assumption of the stellate form.

Such is the anatomy of cartilaginous tumours; and now, in relation to their physiology, several points may deserve notice.

Their rate of growth is singularly uncertain. They may increase very slowly. I have seen one not more than half an inch long which had been at least four years in progress. Or, after a certain period of increase, they may become stationary; as often happens in the tumours that occur in large numbers on the hands. Or, from beginning to end, their growth may be very rapid. I remember a man, 26 years old, in St. Bartholomew's Hospital, in whom, within three months of his first noticing it, a cartilaginous tumour increased to such an extent that it appeared to occupy nearly the whole length of his thigh, and was as large round as my chest. He had a pale unhealthy aspect, and suffered much from the growth; and its size and rapid growth, the tension nearly to ulceration of the skin over it, the enlarged veins, and loss of health, made all suppose it was a great cancerous tumour. Mr. Vincent, therefore, decided against amputation of the limb, and the patient died exhausted, within six months of the first appearance of the disease. The examination after death proved that a great cartilaginous tumour, with no appearance of cancerous disease, had grown within and around the middle two-thirds of the femur. The bone, after extension by the growth within it, had been broken, and all the central part of the tumour was soft, nearly liquid, and mixed with fluid blood and decolourised blood-clots.

In another case, under Mr. Lloyd's care, a cartilaginous tumour, surrounding the upper two-thirds of a girl's tibia, grew to a circumference of two feet in about 18 months. Gluge* also mentions a case in which, in a boy 14 years old, a cartilaginous tumour on a tibia grew in 3½ months to the size of a child's head, and protruded, and caused such pain and hectic, that amputation was necessary.

I need only refer to the importance of these cases in their bearing on the diagnosis of tumours, and as exceptions to the general rule that the malignant grow more rapidly than the innocent.

In extent of growth, the cartilaginous tumours scarcely fall short of the fibrous. Mr. Frogley† has related two cases of tumours of enormous size. In one, the patient was a young woman 28 years old, and the tumour, of nearly five years' growth, around the shaft of the femur, extended from the knee-joint to within an inch of the trochanters, and measured nearly three feet in circumference. It was a pure cartilaginous tumour, but its whole central part was soft or liquid, and many of the nodules of which it was composed had the character of cysts, through such central softness as I shall presently have to describe. The limb was removed near the hip-joint, and the patient has remained in good health for seventeen years since.‡

In the other case by Mr. Frogley, the patient was a lady 37 years old, and the tumour had been growing eleven years; it was 20½ inches in circumference, and exactly resembled that in the former case. The amputation of the limb was equally successful.

* Pathologische Anatomie, Lief. iv.

† Medico-Chirurgical Transactions, vol. xxvi.

‡ I have to thank Mr. Frogley for affording me this information, and Mr. Lane for an opportunity of exhibiting at the Lecture the remarkable specimen obtained by the operation, and now preserved in his Museum.

The tumour in Mr. Lloyd's case, to which I have just referred, measured 24 inches in circumference. But all these are surpassed by an instance related by Sir Philip Crampton, in which a tumour of this kind surrounding the femur, and soft in all its central parts, measured no less than 6½ feet in its circumference.

The only change of cartilaginous tumours which can be spoken of as a development, is their ossification: and this is, I believe, in all essential and minute characters, an imitation of the ossification of the natural cartilages.

But the more general or larger method of ossification must also be observed. Ossification may ensue, I suppose, in any cartilaginous tumour; but it is rare or imperfect in those that grow within bones, and is yet more imperfect, and is like the deposit of amorphous calcareous matter, in those that lie over the parotid gland. It is best seen in those that lie upon or surround the bones; and in these, two methods of ossification may be noticed.

In one method, the ossification begins at the surface of the bone, where the cartilaginous tumour rests on it, and thence the new-formed bone grows into the cartilage. Thus, the ossification may make progress far into the substance of the cartilage; and the tumour may appear like an outgrowth of bone covered with a layer or outer crust of cartilage, on which the periosteum is applied. Or, extending yet further, the cartilage may by this method be wholly ossified, and the cartilaginous may be transformed into an osseous tumour.

In the other method of ossification, the new bone is formed in the mid-substance of the cartilage. In a large tumour the process may commence at many points, and, extending from each, the several portions of new bone may coalesce with one another, and with that formed in the first method, like an outgrowth from the surface of the original bone. Indeed, this twofold method of ossification is commonly seen in the large tumours that surround long bones.

The ossification ensuing in several points, and thence extending, is plainly, in these tumours, an imitation of the natural ossification of the skeleton from centres in each of its constituent parts. Sometimes, indeed, this natural process is imitated with singular exactness. Thus, in the College-Museum, No. 207 is a portion of a large tumour which was taken from the front of the lumbar vertebræ of a soldier. Half of it is cartilaginous, and half is medullary cancer. The cartilaginous portion consists of numerous small nodules, of various shapes, each of which is invested with a layer of fibro-cellular tissue, as its perichondrium. In many of these, a single small portion of yellow cancellous bone appears in the very centre, each nodule ossifying from a single nucleus or centre, as orderly as each cartilage of the fœtal skeleton might ossify.

FIG. 26.*

I shall speak in the next lecture of osseous tumours, and among them, of those that are formed by these methods.

* Fig. 26. Section of the cartilaginous and cancerous tumour described in the text: reduced one-half.

It may therefore suffice for the present, to say that, in nearly all cases, the bone formed in cartilaginous tumours consists of cancellous tissue, with marrow or medullary substance in its interspaces; and that when the ossification of the tumour is complete, the new cancellous tissue is usually invested with a thin compact layer or outer wall of bone, which, if the tumour have grown on a bone, becomes continuous with the cancellous tissue of that bone.

The principal defect or degeneration noticeable in cartilaginous tumours is manifested in their being extremely soft, or even liquid; a clear, yellow, or light pink, jelly-like, or synovia-like material appearing in the place of cartilage. I call it a defect or a degeneration, because it is not always certain whether it is the result of cartilage, once well-formed, having become soft or liquid, or, whether the soft or liquid material be a blastema, which has failed of gaining the firmness and full organization of cartilage. It is quite probable that the same defective structure would be found in arrests of development as in degeneration; and the history of the cases agree herewith. The conditions in which extreme softness is sometimes found can leave little doubt, I think, that it is in these cases a degeneration,—a liquefaction of that which was once more perfectly nourished; but, in other cases, the softness of structure appears to have characterized the growths from their earliest formation; such, probably, was the case of which the history is told at p. 187; but in many cases we have no guide to the interpretation of the peculiarity.

The soft material of cartilaginous tumour is like melting, transparent, yellowish, or pale pinkish jelly; or like a gum-like substance, or like honey, or synovia, or serum. Such a material may occupy the whole interior of a cartilaginous tumour, one great cavity, filled with it, being found within a wall of solid substance.* Or the whole mass of a tumour†, or its exposed surface‡, may be thus soft or liquid. Often too, we may trace, in individual nodules of a cartilaginous tumour, a process of what I suppose to be central softening, by which, perhaps, the formation of the great central cavities of the large tumours is best illustrated. Thus, in the tumour of cartilage and medullary cancer, of which I have already spoken, as illustrating the process of ossification from a centre in each nodule, there are many nodules, in the centre of which, instead of bone, small cavities full of fluid are seen. So, too, in a large cartilaginous tumour, growing on the pelvic bones of a man 40 years old, a portion of which was sent to me by Mr. Donald Dalrymple, I found a large number of distinct nodules, each with a central cavity full of honey-like fluid: and the state of the cartilage around these cavities, its softness, the fusion of its cell-walls and their contents with its hyaline basis, and the sparing distribution of nuclei in it, make me believe that the softness and liquefaction were the results of a degenerative process.

When the softening may be safely regarded as degenerative, it is still, often, very difficult to say to what the change is due. In some cases it appears connected with the great bulk of the tumour, and the hindrance to the sufficient penetration of blood to its central parts. Hence it is, I think, proportionally more frequent in the large than in the smaller

* As in Mr. Frogley's case; and as in many nodules of the tumours, No. 207 and others, in the Museum of the College of Surgeons.

† See a drawing of one in the hand, and a specimen in Ser. 1, 115, in the Museum of St. Bartholomew's, and the specimen lately given to the Museum by Mr. Bickersteth, and described in page 188.

‡ Mus. Coll. Surg, No. 206.

tumours. In some cases it may be due to exposure of the tumour, as in the instance of a cartilaginous tumour which grew from the sacro-iliac symphysis and adjacent bones, and projected into the vagina of a woman 34 years old.* But in many more cases we are unable to assign a reason for such softness.

The central softening of single nodules of cartilaginous tumours may extend to the formation of cysts; for when the whole of a nodule is liquefied, the fibro-cellular investment may remain like a cyst enclosing the liquid. This change was shown in the same tumour as illustrated the central ossification and the central softening. And it was not difficult to trace in it what appeared like gradations from central to complete liquefaction, and from a group of cartilaginous nodules to a group of cysts with tenacious fluid contents.

When extensively softened or liquefied, or when almost wholly transformed into cysts with viscid contents, the cartilaginous tumours are very like masses of colloid cancer;† so like, that the diagnosis, without the microscope, might be nearly impossible. Such a tumour was sent to me by Mr. E. Bickersteth. A woman, 45 years old, had two tumours, one on the eminence of the right frontal bone, the other half an inch below the right clavicle. The former was globular, as large as a walnut, and fixed to the bone. It felt soft and doughy, but at its base and around its margins it was hard. The latter was about twice as large, subcutaneous, and freely moveable; it felt like a fatty tumour, except in that it was not distinctly lobed, and was less firm

* Mus. Coll. Surg. No. 206.

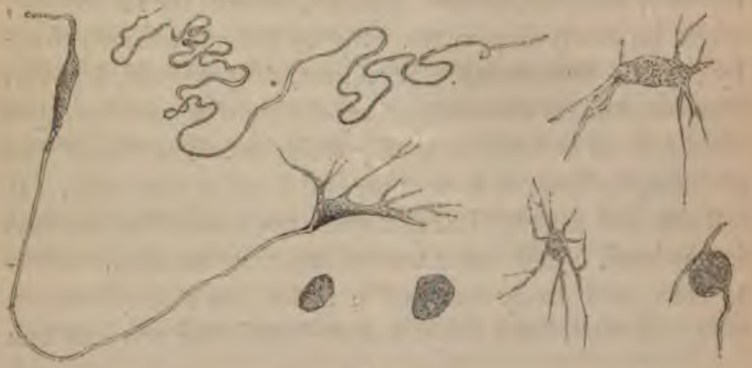
† I believe they have been often described as such. I think, too, that some of them are included by Vogel in his group of "gelatine-tumours" (Gallertgeschwülste), of which he says gelatiniform cancers are the most frequent form.

and consistent than such tumours usually are. Both tumours had been gradually increasing for eight years, and had been painless. The patient's mother had died with hard cancer of the breast.

The tumour below the cavicle was removed. It was an oval mass, invested by a thin fibro-cellular capsule, partitions from which intersected it, and divided it into lobes of unequal size, distinct, but closely packed. They all consisted of a soft, flickering, yellow, and pale ruddy substance, widely intersected with opaque-white lines. The substance was extremely viscid, and could be drawn out in strings, sticking to one's fingers, like tenacious gum. Its general aspect was very like that of a colloid cancer, but it had no alveolar or cystic structure, and it was an isolated mass, not an infiltration. Portions lightly pressed (for it needed no dissection for the microscope) showed as in the annexed

Fig. 27.

A



B

figure (27), together with a small quantity of common fibro-cellular tissue and fat, a peculiar filamentous tissue in curving and interlacing bundles, and in separate very long and very tortuous, or curled filaments, or narrow flat bands (A). The latter appeared as peculiar pale filaments, about $\frac{1}{12000}$ of an inch in diameter; in shape and mode of coiling resembling elastic fibres, but not having dark edges, and extending to an extreme length. Such fibres lay imbedded in a pellucid viscid substance, and more abundantly scattered in the same were various corpuscles (B). Of these some were simple, others of more complex forms. The former were, generally, nearly round, dimly nebulous, with one or two shining particles, but (unless in a very few instances), without nuclei. These seemed to be free nuclei, of which many had grown to an unusual size, and measured $\frac{1}{1000}$ of an inch in diameter. The more complex had the same texture as these, and seemed to be also altered nuclei, and resembled most nearly the stellate nuclei of more ordinary cartilaginous tumours. They generally had an oval, or round, or angular body or central part, from which slender processes passed out. These followed various directions. Some were short; some branched once or more; some were extremely long, and appeared to connect adjacent corpuscles, or to be continued into some of the tortuous bands or filaments, like which, as they extended further, they became pale, clear, and finely edged. The chief and extreme forms are sketched, and many intermediate between these existed.

Since the operation the patient has remained well, and the tumour on the head has been stationary for four months; so that, therefore, the history has confirmed the only opinion I could form of so strange a tumour, namely, that it was composed of immature soft fibrous cartilage, not only arrested, but in a measure perverted in its development.

The softened central parts of cartilaginous masses are apt to be affected with rapid sloughing or suppuration. Such an event occurred in Sir Philip Crampton's case already quoted, and in one, presenting many features of great interest, which was under Mr. Lloyd's care, at Saint Bartholomew's Hospital.* A girl, 14 years old, was admitted with a very large tumour round the upper two-thirds of the tibia. It had been growing for 18 months, and shortly before her admission, without any evident cause (unless it were that it had been punctured), the integuments over it began to look inflamed and dusky. The limb was amputated almost immediately after her admission; and the tumour presented in its interior a large cavity with uneven broken walls, filled with brownish serous fluid of horribly offensive putrid odour. The inner surface of the walls of the cavity appeared also putrid, and gases, the products of the decomposition, were diffused in the cellular tissue as far as the middle of the thigh.

Other changes of a degenerative character may be sometimes observed in cartilaginous tumours. Parts of them may appear grumous, or pulpy, and of an ochre yellow colour.† This is probably a fatty degeneration of their tissue. And, sometimes, as I have said, their ossification is so imperfect as to be more like a fatty and calcareous degeneration, in which their substance becomes like fresh mortar, or soft chalk, and, when dry, is powdery, and white, and greasy.

It may serve for additional illustration of this general pathology of cartilaginous tumours, if I describe now some particular forms of them.

I have said that they chiefly affect the bones. The bones

* It is fully reported in the Lancet, Dec. 1850. The specimen is in the Museum of the Hospital.

† Mus. Coll. Surg., No. 200.

‡ Mus. Coll. Surg., No. 204. Rokitansky, B. i. p. 262. Mr. Humphry has particularly described this change in his Lectures, p. 142.

of the hands are their most frequent seats; and next to these, the adjacent extremities of the femur and tibia, the parts which, for some inexplicable reason, appear to have in all the skeleton the least power of resistance of disease. After these, the humerus, the last phalanx of the great toe, the pelvis, and the ribs, appear most liable to cartilaginous growths; and after these, the number of cases is as yet too small to assign an order of frequency, but there is scarcely a bone on which they have not been seen.

Of the cartilaginous tumours of the large long bones I need say little, having drawn from them the greater part of the general description. Only, the relations of the growths, according to the part of the bone in or near which they lie, may be worth notice.

When, then, the tumour grows at or about the articular end of a large long bone, it is almost wholly placed between the periosteum and the bone. Here it usually surrounds the bone, but not with an uniform thickness; and the thin wall of the bone wastes and gradually disappears as if it were eroded, or as if it changed its form, becoming cancellous, and then growing into the tumour. I have never seen such a tumour encroaching on the articular surface of a bone. But it may grow up all about the borders of the joint, and surround them. A striking example of these relations of the cartilaginous tumour to the bone on which it grows is in one of the best and most characteristic specimens in the College-Museum;* a cartilaginous tumour of the humerus, removed in an amputation at the shoulder-joint by Mr. Liston. His sketch of it is here copied.

* Mus. Coll. Surg., 779. The patient recovered from the operation, but died two months afterwards with disease of the chest. The specimen is represented in Mr. Liston's Practical Surgery, p. 374, from which the sketch (fig. 27) is drawn.

FIG. 27.

The patient was a naval surgeon, and the tumourhad been growing for nearly forty years. The mass it now forms is nearly ten inches across; it surrounds the upper three-fourths of the shaft of the humerus, and nearly surmounts its articular surface; and it shows abundant isolated nodules, partial central ossification and central softening, and the growth of bone from the cancellous tissue of the humerus into the tumour. It shows too, very well, how blood-vessels and nerves are imbedded in the inequalities of such tumours, without being involved by them.

It is extremely rare, I think, for a cartilaginous tumour to grow within the articular end, or in the medullary tissue near it, in a large long bone. A striking specimen, however, was presented by Mr. Langston Parker to Mr. Stanley. It was removed, by amputation of the lower part of the leg, from a young gentleman in whom it had grown slowly, and had distinctly pulsated. The lower end of the fibula is expanded and wasted by a growth of cartilage, mixed with a substance such as will be described in the next lecture, as the characteristic material of fibro-plastic or myeloid tumours.

The growth is rather larger than an egg, and is invested by the remains of the expanded fibula, and by the periosteum; and the relations of the chief blood-vessels make it probable that the pulsation felt during life was derived from that of the vessels within the tumour.*

When a cartilaginous tumour grows at the middle of the shaft of a large long bone, it is, I think, usual to find coincidently both an external and an internal growth. Cartilage lies outside the shaft, beneath the periosteum; and another mass may fill the corresponding portion of the medullary canal. Then, in the concurrent growth of the two masses, the wall of the bone between them wastes or is broken-up, and they may form one great tumour set between the portions of the shaft.† These are the cartilaginous tumours which most imitate the progress of malignant disease. They are indeed very rare; but the chance of the existence of such an one, where we might be anticipating a malignant tumour, is always to be added to the motives for amputation in cases of tumours round the shafts of these long bones.

When cartilaginous tumours grow at the attachment of

* The specimen is in the Museum of St. Bartholomew's Hospital. No. 783 in the Mus. Coll. Surg. is an ossified cartilaginous tumour within the upper end of the fibula. In the Museum of St. Thomas's Hospital is a most remarkable instance of cartilaginous tumours growing, at once, in the scapula, the upper part of the humerus, and the lower part of the same. In the last-named part the cartilage lies within the thinned walls of the bone. The case is described by Mr. William Adams, in the Proc. of the Pathol. Soc., vol. ii.

† A specimen of this form is in the Museum of St. Bartholomew's in and upon a femur, in Ser. i. No. 111; and one of very large size, around and in the upper third of the femur, is in Guy's Hospital Museum. One also is mentioned by Mr. Hawkins as occurring in the middle of the shaft of the humerus (Medical Gazette, vol. xxv. p. 476.)

tendons (and they often do so, especially about the lower part of the femur), they are peculiarly apt to acquire narrow bases of attachment. In these cases, one usually finds a layer of cartilage incrusting some cancellous and medullary bone, and the bone, as a narrow pedicle, extends into continuity with the wall or the cancellous tissue of the subjacent shaft. Such tumours have then the characters of polypoid out-growths from the bone, and may be treated accordingly; for, when cut or broken off, their stems (at least, if they consist of only bone) will not grow. Indeed, this stem may chance to be unwittingly broken; as in a tumour* removed by Mr. Lawrence. It had grown on the inner and lower part of the femur, and, when fairly exposed, was easily detached without further cutting: the narrowest part of its stem rested in a slight depression in the femur, but had no connection by tissue with it. It seemed as if the narrow pedicle of a tumour, two inches in diameter, had been by accident broken off, and the friction of the broken surfaces had smoothed and fitted them together.

Such are some of the chief facts to be noted about the cartilaginous tumours on the large long bones.

On the jaws these tumours are, I believe, very rare. I know but one specimen on the upper jaw alone; a great tumour, portions of which are preserved in the Museum of Guy's Hospital, and of which the history, by Mr. Morgan, is in the Hospital Reports.

On the lower jaw, such tumours appear prone to acquire a peculiar shape, affecting the whole extent of the bone. One of the most remarkable tumours in the Museum of the College† is of this kind. The patient was a lady thirty-nine years old. The tumour had been growing eight years; it com-

* Mus. St. Bartholomew's, Ser. i. 183.
† No. 1034 and 201.

menced as a small hard tumour just below the first right molar tooth, and gradually enlarged till it enclosed the whole jaw, except its right ascending portion. It measured two feet in circumference and six inches in depth, and the patient died exhausted by want of food, which she was unable to swallow, and by the ulceration of parts of the tumour during the last two years of her life.

M. Lebert* has recorded a case in which a tumour like this was removed by Dieffenbach. In three successive operations he removed it by instalments, and the patient finally recovered.

The cartilaginous tumours that grow about the cranial bones and the vertebræ show, in a marked manner, that reckless mode of growth (if I may so speak) which is more generally a characteristic of malignant tumours. They grow in every direction; pressing, and displacing, and leading to the destruction of, important parts, and tracking their way along even narrow channels.

In St. Bartholomew's is a tumour,† composed, for the most part, of cartilage, which grew in connection with the bones of the face and head of a lad sixteen years old. It involved both superior maxillary bones, extended into the left orbit, and through the left side of the base of the skull into its cavity, compressing the anterior lobes of the cerebrum: it was also united to the soft palate, and protruded the left nostril, and the integuments of the face.

The commencement of a similar growth is probably shown in a specimen in the College-Museum,‡ in which, together with changes effected by the growth of nasal polypi,

* Abhandlungen, p. 197.

† Mus. St. Bartholomew's Hospital, Ser. xxxv. No. 47. Drawn in Mr. Stanley's Illustrations of Diseases of the Bones, pl. xvii. fig. 4.

‡ Mus. Coll. Surg. 2199.

one sees the ethmoid cells completely filled with firm semi-transparent cartilage, a mass of which projects in a round tumour into the upper part of the left nasal fossa.

And here I may adduce, in proof of the tracking growth of the cartilaginous tumours, the case of one* originating in the heads of the ribs, which extended through the inter-vertebral foramina into the spinal canal, where, growing widely, and compressing the spinal cord, it produced complete paralysis of the pelvic organs and the lower extremities.

The cartilaginous tumours of the hands deserve a special notice.

As many, I believe, as forty cases might be collected from various records, in which the bones of one or both hands, and sometimes of the feet also, have been the seats of numerous cartilaginous tumours. Several of these cases were collected by John Bell ;† many more by Müller,‡ who drew, indeed, from these cases the greater part of his general account of enchondroma; and many more might now be added to the list. Four admirable specimens of the disease are in the Museums of the College and of St. Bartholomew's.

The first of these,§ from the collection of Sir Astley Cooper, consists of the amputated fingers and heads of the metacarpal bones of a girl 13½ years old. Tumours had been growing in these bones for eleven years; and now

* Mus. St. Bartholomew's Hospital, Ser. i. No. 115.

† Principles of Surgery, vol. iii. p. 65.

‡ On Cancer. Whenever the statements made by Müller respecting the general characters of cartilaginous tumours differ from the account here given, the differences may, I think, be explained by his taking for the type the tumours of the hand. This alone could have made him regard so little the ossification of cartilaginous tumours.

§ Mus. Coll. Surg., 775.

there are eleven or twelve, from half an inch to an inch and a half in diameter, and all formed of pure cartilage.

The second was presented to the Museum of St. Bartholomew's by Mr. Hodgson.* It comprises the right hand, and the little finger of the left hand, of a lad 14 years old, in whom, without any known cause, the tumours had been growing from early childhood. In the right hand, the metacarpal bone of the thumb contains two tumours; that of the fore finger three or four tumours, of which the smallest is an inch, and the largest is three inches in diameter: the first and second phalanges, also, of the fore finger, contain tumours; the middle finger appears normal; the third finger has one tumour in its metacarpal bone, one in its first phalanx, and two in its second phalanx; the little finger has as many, in corresponding positions. On the left hand the only tumour was that in the first phalanx of the fore finger.

A third preparation† contains the fore and little fingers removed by Mr. Lawrence from a healthy lad seventeen years old. He had on his left hand four, and on his right hand six tumours; but those that were removed were alone troublesome and increasing. They varied from one inch and a half to one-third of an inch in diameter, were all covered with healthy smooth skin, and appeared to grow from the interior of the bones. No account could be given of their origin, except that they began to grow when he was five years old; and some grew more quickly than others. In both fingers a formation of cartilage has occurred in the metacarpal bones and the second phalanges, which was attended with scarcely any swelling: indeed, till the operation was being performed, these bones were not supposed to be

* Described in the Pathological Appendix to the Catalogue.

† Mus. St Bartholomew's, Pathol. Appendix.

the seats of disease, though their medullary cavities were quite full of cartilage.

Fig. 29.*

The fourth specimen, here sketched, is, I believe, the most remarkable yet seen. I received it from Mr. Salmon, of Wedmore. It is the right hand of a labourer, fifty-six years old, from whom, when he was sixteen years old, the fore-finger of the left hand was removed with a tumour weighing 2lb. 5oz. The little finger of the same hand has a tumour about as large as a walnut: the whole length of his left tibia has irregular nodules on its anterior and inner surface, and some enlargement exists at his left second toe. On the right hand, which Mr. Salmon amputated, there are tumours on every finger, and one spheroidal mass nearly six inches in diameter, in which the second and third fingers appear completely buried, the walls of their phalanges being only just discernible at the borders of the mass that has formed by the coalition of tumours that grew within them.

The disease which these specimens illustrate begins, I believe, exclusively in the early period of life; during child-

* Fig. 29. Hand with cartilaginous tumours, described above. Reduced to one-fifth of the natural size.

hood, or at least before puberty, and sometimes even before birth. It occurs, also, much more frequently in boys than in girls. One or more, or nearly all, of the phalanges or metacarpal bones of one or both hands may enlarge slowly, and without pain, into an oval, or round or heart-shaped swelling. When such swellings are grouped, they produce strange distortions of the hands, making them look like those of people who have accumulated gouty deposits; or, as John Bell delights to repeat, like the toes and claws of sculptured griffins. They may greatly elongate the fingers, but they more commonly press them asunder, limiting and hindering their movements.

There is no rule or symmetry observed in the affections of the hands, except that the thumb is less frequently than the fingers the seat of growths.

In the large majority of cases, if not in all, each tumour grows within a bone, the walls of which are gradually extended and adapted to its growth. And this position within the bones is the more remarkable, because, in the cases of single cartilaginous tumours of the fingers or hands, the growth takes place not more, but rather less, often within than without the bone; these single tumours commonly growing, as those of the larger long bones do, between the periosteum and shaft.*

Thus, growing within the bones, the cartilaginous tumours may be sometimes found, even in the same hand, in all stages of growth. One phalanx or metacarpal bone may have its medullary cavity full of cartilage without any external appearance of enlargement; another may be slightly swollen-out at one part, or in its whole periphery; another so extended on one side, or uniformly, that its walls form only a thin shell around the mass of cartilage; in another the cartilage may have grown out through holes absorbed

* Mus. Coll. Surg. No. 772-3.

in the walls of the bone, and may then have spread out on its exterior; while from another it may have protruded through apertures even in the integuments, gradually thinned and ulcerated:* or, as the specimen sketched in Fig. 29 shows, we may find not only such a protrusion through integuments, but two originally distinct tumours, growing out beyond the limits of their respective bones, and coalescing in one huge mass. In cases of this kind, the cartilaginous mass in each bone usually appears as a single tumour, with very delicate, if any, partitions. It may have a coarsely granulated aspect, but it is rarely divided into distinct nodules, or strongly intersected. Its exterior is adapted closely to the interior of the shell of bone, but is not continuous with it, except by blood-vessels. It rarely ossifies, except in a few small scattered cancellous masses in its mid-substance.† And it is worth observing, that the tumours often project on only one side of a bone; for when this happens in the metacarpus, it is often very hard to tell which of two adjacent metacarpal bones should be cut-out in case of need.

The cases of this singular disease have shown great diversity as to the cause of the tumours, and in their modes and rates of growth; some making progress, some remaining stationary: and I believe it has often happened that at the time of manhood all have ceased to grow. But in regard to all these questions, important as they are, we are yet in need of facts.

It would be easy, and as vain as easy, to speculate on the meaning of such a disease as this. I believe no reason-

* A good case illustrating the last-mentioned fact is represented by Professor Miller, in his Principles of Surgery, p. 179. The tumour on the back of the metacarpus weighed fourteen pounds, and after protrusion bled frequently. John Bell also has recorded several such cases.

† Specimens of ossification are in the College-Museum, No. 785-6.

able explanation of it can as yet be given, unless it may be said that these are the results of an exuberant nutrition similar to that which in the embryo may produce supernumerary limbs, but is here more disorderly and less vigorous.

The only remaining instances of cartilaginous tumours to which I shall refer are those that grow near the parotid, or, much more rarely, near the submaxillary gland.* Some of these are formed of pure cartilage, and might be taken as types of the cartilaginous tumour; but more are composed of cartilage, or fibrous cartilage, variously mixed with other tissues, and especially with what appears to be an imperfect or a perverted glandular tissue. Whichever of these forms they may have, they are commonly imbedded in the gland. They are sometimes wholly surrounded by the gland-substance, but much more commonly are more or less deeply imbedded in it, and covered with its fascia.

These tumours are generally invested with tough fibro-cellular capsules, which, though sometimes loose, are more commonly so closely attached to the surrounding parts that it is difficult to dissect them out. And the inconvenience of this is not a little increased by the frequent contact of branches of the facial nerve, which are apt to adhere very closely to the deep part of the tumour, or to be imbedded between its lobes, or may even stretch over its surface.†

* These are grouped by Rokitansky as the third variety of the Gelatinous Sarcoma, with a recognition of their affinity to Enchondroma. Mr. Syme names them "Fibro-cartilaginous Sarcoma" (Principles of Surgery, vol. i. p. 89). The first good description of them was given by Mr. Lawrence (in his paper on Tumours, already often quoted). Mr. Cæsar Hawkins described them, for the most part, as "conglomerate tumours."

† The imbedding of important parts in a cartilaginous tumour need

The general aspect of these tumours depends much on the proportion in which the cartilage and their other component tissues are mixed. When they are of pure cartilage, or when the cartilage, or delicately fibrous cartilage, greatly predominates, they may present all the general characters that are already described. Such a case is illustrated by that to which, among all the specimens of the kind, the primacy belongs. It was removed by Mr. Hunter, and is enough to prove the skill and boldness as an operator which some have denied him. The case was that of a man, thirty-seven years old, who, sixteen years previously, fell and bruised his cheek. Shortly after the injury, the part began to swell, and the swelling regularly increased for four or five years, when he again fell and struck the swelling, which, after this, extended especially at its lower part and base. It seemed quite loose, and moveable without pain. Mr. Hunter extirpated it, and with complete success. It weighed 144 ounces, and measures in its chief dimensions 9 inches by 7. It presents a striking instance of the conglomerate cartilaginous tumour, consisting of numerous round masses of pale, semi-transparent, glistening cartilage, connected by their several fibro-cellular investments; and its exterior is deeply lobed and nodulated. Its apparent composition is confirmed by the microscopic examinations of Mr. Quekett,* who found it composed of cartilage, in which some of the intercellular substance is homogeneous, and some finely fibrous.

But when in these tumours the cartilage is equalled or exceeded in quantity by the other tissue of which they

be remembered. In the Museum of St. George's Hospital is a specimen of this kind, about seven inches in diameter, which was sent to the Museum with the history, that, in removing it from the deep tissues of the thigh, the femoral artery was cut across where passing through its substance.

* Histological Catalogue, vol. i. p. 111. Ag. 52.

FIG. 30.*

may consist, we may find the same oval and nodular or lobed form, and the same hardness or firmness and elasticity, but they appear, on section, opaque white or cream-coloured, and less glistening than cartilage.† Generally, these mixed tumours appear uniform; but, sometimes, portions of purer cartilage are imbedded in the mixed tissue, and obscurely bounded from it.‡

In microscopic characters the cartilaginous part of these tumours has, I believe, no peculiarity; different specimens may offer all the variety of forms to which I have already referred.

* Fig. 30. Minute structures of a mixed cartilaginous tumour over the parotid gland. In the upper sketch, a group of withered, stellate, cartilage-nuclei are encircled with fibrous tissue. Others lie near the group; while, equally near, are well-formed cartilage-cells, and groups of small nuclei or nucleated cells, like those of gland-structures. In the lower sketch similar corpuscles are grouped as in the acinus of a gland.

† They are among the tumours which one finds described as like turnips or like potatoes.

‡ I have often endeavoured to see whence this mixture of tissues results, and especially whether the one tissue is transformed into the other; but I have not been able to discover this. It may be that these tumours are, in the first instance, composed wholly of one of the two principal tissues, and that in their further growth this primary tissue is superseded by the other. But it is, perhaps, more

The tissue mixed with the cartilaginous is at present, I think, of uncertain nature. In five cases I have found it, for the most part, present a lobed and clustered structure, with fibrous-looking tissue encircling spaces that are filled with nuclei and cells. These enclosed spaces look so like the acini of a conglomerate gland, that they seem to confirm the opinion one might form from its general aspect; namely, that it is an imitation of gland-tissue. And this is confirmed by the character of the cells within the seeming acini; for they have the general traits of gland-cells. They are usually small, round or oval, flattened, dimly granular, with nearly round, pellucid nuclei with nucleoli. They lie either like a thin epithelial lining of the spaces I just mentioned, or else they are clustered within them; or they may be irregularly grouped through the whole substance of the tumour; and in all cases abundant free nuclei like their own are mingled with them.

Such are the most general characters of these cells; but they are apt to vary from them, being more angular, or bearing processes, or being attenuated or caudate. Even if we may consider them as imitating gland-structures, yet it may be a question whether they are related to the adjacent parotid gland, or to lymphatic gland. It would be easy to discriminate between the elements of the parotid and of a lymphatic in their natural state; but a morbid imitation of either of them may deviate far enough to be as much like the other. And it is well to remember that these tumours have exactly the seats of naturally existing lymphatic glands, and are often closely imitated by mere en-

probable that in an apparently uniform blastema, two or more different structures should be developed, and thence-forward coincidently grow.

largements of these glands; so that, possibly, future researches may prove that they are cartilaginous tumours growing in and with a lymphatic gland over or within the parotid or submaxillary gland.

In general history, especially in their slow and painless growth, the absence of any morbid influence, except that produced by pressure, on the surrounding parts, the absence of proneness to foul ulceration, and of tendency to return after removal; in all these, the tumours over the parotid agree, I believe, with the other forms of cartilaginous tumours. I will therefore not delay to relate cases of them; but will draw towards conclusion by referring to some points connected with the general history and nature of the whole group of cartilaginous tumours.

First, then, concerning their origin:—They begin, in a large majority of cases, in early life; between childhood and puberty. Yet they may begin late in life. I saw one on the hand, which had been of no long duration when it was removed from a man 70 years old; another, growing in the humerus, and described by Mr. W. Adams,* had grown quickly in a man of 61; another began to grow at the same age, in a woman's thumb.† Most commonly, also, those in or near the parotid appear in or after middle age.

Then, concerning their nature: they may be regarded as, usually, completely innocent tumours, and yet there are some cases recorded, in which we must believe that, after a cartilaginous tumour has been removed, another has grown in the same place. I saw one such in a woman 30 years old, in whom, soon after the removal of one tumour from

* Proceedings of the Pathological Society, ii. 344.
† Lebert; Abhandlungen, p. 191.

the parotid region, another grew and acquired a great size. This was an unmixed cartilaginous tumour; and I believe the first was of the same nature. Dr. Hughes Bennett* has related a case in which Mr. Syme removed a cartilaginous tumour of the arm by amputation at the shoulder-joint. Subsequently, the patient, a girl 14 years old, died with tumours in the stump and axilla. Mr. Liston removed a portion of the scapula, with a great tumour in its spine and acromion, which I have no doubt is a soft cartilaginous tumour.† Three years afterwards the patient died, with what is described as a return of the disease. Mr. Fergusson showed at the Pathological Society a fibro-cartilaginous tumour‡ of the lower jaw, which had grown twice after the complete removal of similar tumours from the same part. In the Museum at Guy's Hospital, also, there is a cartilaginous tumour growing from the angle of the lower jaw into the mouth, which is said to have grown after complete removal of a similar tumour with the portion of lower jaw to which it was connected. Lastly, Professor Gluge§ records two cases, in which we must believe that recurrence of cartilaginous tumours ensued after complete removal. In one, a cartilaginous tumour, of 13 years' growth, and 9½ pounds weight, over a man's scapula, clavicle, and neck, returned in the ribs, and destroyed life in a year and a half. In another, a similar tumour of the orbit returned two and a half years after removal.

We must conclude, I think, from these cases, that, although the general rule of innocence of cartilaginous tumours is

* On Cancerous and Cancroid Growths, pp. 108 and 258.

† College-Museum, No. 781.

‡ Mr. Simon examined it with the microscope, and found it formed of well-marked cartilage, with a fibrous basis.

§ Atlas der pathologischen Anatomie, Lief. iv.; and Pathologische Histologie, p. 67.

established by their usual history, by numerous instances of permanent health after removal, and by cases in which, after death, no similar growths are found in lymphatics or internal organs, yet recurrence after operations may ensue. I think that when this happens it will generally be found that the recurring growths, if not the original growths also, are soft, rapid in their increase, and apt to protrude and destroy adjacent parts; as if we had, again, in these, an instance of that gradual approximation to completely malignant characters, of which I spoke in the last lecture. I think, too, that we shall find that these soft cartilaginous tumours which are apt to recur, or of which more than one exist in distant parts in the same patient, affect particularly those who are members of cancerous families (see p. 188).

In connection with these points I may refer to some additional facts in the pathology of cartilaginous tumours.

First, many may exist in the same person; secondly, they are sometimes hereditary; thirdly, they are not unfrequently mingled with cancerous growths.

Multiplicity is sufficiently marked in the cases of the hands and feet, but has been observed, though more rarely, in other parts; as in a case recorded by Mr. William Adams, and already referred to, as presenting tumours at once in the scapula and parts of the humerus. The case by Mr. Bickersteth (p. 188) was probably of the same kind.

The hereditary occurrence was observed in the case of a cartilaginous tumour of the pelvis, of which I have already spoken, as examined by Mr. Donald Dalrymple. The patient's father had a large ossified enchondroma of the radius, which was removed by Mr. Martineau.*

* The specimens are in the Museum of the Norfolk and Norwich Hospital. In the number of the Edinburgh Monthly Journal, vol. xiii. p. 195, an abstract of the case is published by Dr. Cobbold,

The conjunction of cartilaginous and medullary cancerous tumours may, perhaps, be called frequent, especially in the testicle.

A man, 38 years old, was under Mr. Lawrence's care with an apparent enlargement of one testicle, which he ascribed to a blow received eighteen months previously. Three weeks after the blow he noticed an enlargement which regularly increased, and formed an oval mass about four inches long. This, at its upper part, was moderately firm and elastic; but in the lower third it felt incompressibly hard. It was removed, and proved to be a pale, soft, greyish, medullary cancer in the testicle, having in its lower part a mass of cartilage, with scattered points of bone, and some intercellular tisssue.* The patient died a fortnight after the operation; and it was interesting to observe, as illustrating the contrast between the cartilaginous and the cancerous growths, that he had soft medullary cancerous tumours in the situation of his lumbar lymphatic glands, but no cartilaginous tissue in or mingled with them.

A specimen closely resembling this, and with a very similar history, is in the Museum of the University of Cambridge. Another is in the Museum of Guy's Hospital, of which it is said that the patient died with return of the medullary disease. Müller noticed the same combination.† Virchow‡ has cited two cases, and described one, all illus-

who relates, in addition to the facts I had learnt from Mr. Thomas Crosse, that a brother of the man who had the tumour in the pelvis has mollities ossium, and that "others of his kindred had been subjected to the debilitating influences of a perverted nutrition."

* The specimens and drawings are in the Museum of St. Bartholomew's.

† On Cancer.

‡ Verhandl. der phys.-med. Gesellschaft in Würzburg, i. p. 134. Baring (Ueber den Markschwamm der Hoden, Pl. ii.) has represented a similar specimen.

trating the same singular fact. In the three specimens that I have seen of conjunction of cartilaginous and medullary growths in the testicle, the cartilage appears as an isolated mass in the substance of the medullary tumour, and is enclosed in a distinct capsule. There are other cases, however, in which the two morbid substances, though distinct, yet lie in so close contact that they are confused with one another. Thus, in a tumour which, as already mentioned, (p. 184), was attached to the front of the lumbar vertebræ, and weighed thirteen pounds, half was formed of soft flocculent medullary cancer, and half of nodules of cartilage, some with soft, some with osseous centres.* A tumour removed from over a woman's parotid gland by Mr. Lloyd was invested by a single fibro-cellular capsule; but one half was cartilaginous and the other looked like medullary substance, and they were mingled, with no distinct boundary-line, at their contiguous borders.† And lastly, in a case of which preparations are in the Museum of St. Thomas's Hospital, Mr. Dodd removed a genuine and apparently unmixed cartilaginous tumour from a man's ribs; but, in three months, another tumour appeared in the same part, formed of closely mingled cartilage and medullary substance. This quickly proved fatal.

I need hardly remark on the bearing which this last case may have on the question of the recurrence of cartilaginous tumours, and on that of the changes of character which may ensue in tumours generally, at their successive occasions of recurrence. It gives to all these cases a much higher

* Mus. Coll. Surg. 207; Mus. St. Bartholomew's, Ser. xxxv. No. 49.

† Mus. Coll. Surg. 207 A; Mus. St. Bartholomew's, Ser. xxxv. No. 45. The patient was alive at least seven years after the removal of the tumour.

interest than would attach to them if regarded only as rarities and strange things.

But it is not with the malignant diseases alone that cartilage is found in tumours. I have described it as combined with what appears like glandular tissue in the tumours over the parotid, and I have seen bone in similar combination in a tumour in the lip. Specimens are not rare in which closely grouped nodules, and irregular masses, of pure white cartilage are imbedded in fibro-cystic tumours in the testicle. In speaking of the fibro-cellular tumours, I mentioned two in which cartilage was similarly mingled with their more essential constituent; and in the Museum of Guy's Hospital is a tumour removed from beneath the gastrocnemius muscle, which consists of both fibro-cellular and adipose tissue, with abundant imbedded nodules of cartilage. And, lastly, similar combinations appear to exist of cartilaginous growths with those which M. Lebert named fibro-plastic, and which will be described in the next lecture as myeloid tumours. Such is, I believe, the composition of three tumours in the Museum of St. Bartholomew's,—of which one surrounds the head of the tibia;* another involves the bones of the face, and extends into the cranium;† and a third occupies and expands the lower end of the fibula.‡ The compound structure of the last was ascertained with the microscope, which easily detected the two materials irregularly mingled in every part of the tumour.

In all these facts concerning its combination with other morbidly produced structures, there must be something of

* Series i. 41; and Mr. Stanley's Illustrations, pl. 15, fig. 3.
† Ser. xxxv. 47; and the same Illustr., pl. 13, fig. 4.
‡ Appendix to Pathol. Catal.

much importance in relation to the physiology of cartilage; but as yet, I believe, we cannot comprehend it. Such combinations are not, I believe, imitated in the cases of any other structures found in tumours; even those that are thus combined with cartilage do not, I think, combine with one another, if we except the cases of intra-uterine morbid growths. As yet, however, the interest that belongs to all these inquiries is scarcely more than the interest of mystery, and of promise to future investigators. As yet, we can think scarcely more than that, as innocent tumours, generally, are remote imitations of the abnormal excesses of development which occur in embryo-life, so it might be expected that, in some of them, many of the tissues would be combined in disorder, which, orderly arranged, make-up the fœtus.

? Fibro-Plastic Tumours

LECTURE VIII.

PART I.

MYELOID TUMOURS.

The Tumours for which I venture to propose the name of Myeloid (μυελώδης, marrow-like), were first distinguished as a separate kind by M. Lebert.* Before his discovery of their minute structure, they were confounded with fibrous tumours, or included among the examples of sarcoma, and especially of osteo-sarcoma. M. Lebert gave them the name of "fibro-plastic," having regard to their containing corpuscles like the elongated cells, or fibro-cells, which he has called by the same name, and to which I have so often referred as occurring in the rudimental fibro-cellular and fibrous tumours, and in developing lymph and granulations. But the more characteristic constituents of these tumours, and those which more certainly indicate their structural homology (*i. e.* their likeness to natural parts) are peculiar many-nucleated corpuscles, which have been recognised by Kölliker† and Robin‡ as constituents of the marrow and diploe of bones, especially in the fœtus, and in early life. It seems best, therefore, to name the tumours after this their

* Physiologie pathologique, ii. p. 120; and Abhandlungen, p. 123.

† Mikrosk. Anatomie, B. ii. p. 364, 378.

‡ Comptes Rendus. . . . de la Société de Biologie, T. i. p. 150; T. ii. p. 8, and Mémoires, p. 143.

nearest affinity. On similar grounds, they must be regarded as having a nearer relation to the cartilaginous than to the fibrous tumours; for their essential structures, both the many-nucleated corpuscles and the elongated cells, are (like those of cartilaginous tumours) identical with normal rudimental bone-textures. Moreover, as I have already said, portions of myeloid structure are sometimes mixed with those of cartilaginous tumours, and they are sometimes developed into naturally constructed cancellous and medullary bone. The structures of this group of tumours are, indeed, essentially similar to those found in granulations which grow from, and may be transformed into, bone (see vol. i. p. 185); and to a section of such granulations some specimens bear, even to the unaided eye, no small resemblance.

The myeloid tumours may be found in many situations; but they are far more frequent in or upon the bones than in connection with any other tissue. I have seen them in the mammary gland, and I think in the neck, near the thyroid gland; and M. Lebert mentions many other parts as occasionally containing them, especially the eyelids and conjunctivæ, the subcutaneous tissue, the cerebral membranes, and the uterus.*

As usually occurring in connection with the bones, a

* L. c.; and in Virchow and Reinhart's Archiv, B. iii. p. 463. But I think that in several of these instances he has included in his account tumours containing only the elongated "fibro-plastic" cells; whereas I have reckoned, as belonging to this myeloid group of tumours, none but those which, together with such cells, contained also the large many-nucleated corpuscles, which alone are a peculiar constituent. A tumour containing elongated fibro-cells alone, I should expect to be a rudimental fibro-cellular, or fibrous, or recurring fibroid tumour. They may, also, appear as a chief constituent in tumours containing abundant inflammatory exudation.

myeloid, like a fibrous, tumour may be either enclosed in a bone whose walls are expanded round it, or, more rarely, it is closely set on the surface of a bone, confused with its periosteum. The sketches in p. 146, of fibrous tumours within and upon the lower jaw, might be repeated here for myeloid tumours; and the two kinds are about equally common in the same positions, both within and upon the upper jaw. When enclosed in bone, the myeloid tumours usually tend to the spherical or ovoid shape, and are well-defined, if not invested with distinct thin capsules; seated on bone, they are, as an epulis of this structure may exemplify, much less defined, less regular in shape, and often deeply lobed. They feel like uniformly compact masses, but are, in different instances, variously consistent. The most characteristic examples are firm; and (if by the name we may imply such a character as that of the muscular substance of a mammalian heart) they may be called "fleshy." Others are softer, in several gradations to the softness of size-gelatine, or that of a section of granulations. Even the firmer are brittle, easily crushed or broken; they are not tough, nor very elastic, like the fibro-cellular or fibrous tumours; neither are they grumous or pulpy; neither do they show a granular or fibrous structure on their cut or broken surfaces.

On section, the cut surfaces appear smooth, uniform, compact, shining, succulent with a yellowish, not a creamy, fluid. A peculiar appearance is commonly given to these tumours by the cut surface presenting blotches of dark or livid crimson, or of a brownish or a brighter blood-colour, or of a pale pink, or of all these tints mingled, on the greyish-white or greenish basis-colour.* This is the character

* Lebert says the greenish-yellow colour that they may show depends on a peculiar sort of fat, which he calls Xanthose (Abhandl. 127).

by which, I think, they may best be recognised with the naked eye, though there are diversities in the extent, and even in the existence, of the blotching. The tumour may be all pale, or have only a few points of ruddy blotching, or the cut surface may be nearly all suffused, or even the whole substance may have a dull Modena or crimson tinge, like the ruddy colour of a heart, or that of the parenchyma of a spleen.*

Many varieties of aspect may thus be observed in myeloid tumours; and, beyond these, they may be even so changed that the microscope may be essential to their diagnosis. Often, they partially ossify; well-formed, cancellous bone being developed in them. Cysts, also, filled with bloody or serous fluids, may be formed in them, occupying much of their volume, or even almost excluding the solid texture. In the last case the recognition of the disease is very difficult. I lately amputated the leg of a woman, 24 years old, for what I supposed to be a cancerous tumour growing within the head of the tibia. She had had pain in this part for eighteen months, and increasing swelling for ten months; and it was plain that the bone was expanded and wasted around some soft growth within it. On section, after removal, the head of the tibia, including its articular surface, appeared expanded into a rounded cyst or sac, about 3½ inches in diameter, the walls of which were formed by thin flexible bone and periosteum, and by the articular cartilages above. Within, there was little more than a few bands or columns of bone, among a disorderly collection of cysts filled with

* I believe that many of what have been named spleen-like tumours of the jaws have been of this kind. The colour they present is not due only to blood in them; more of it is appropriate to their texture, as that of the spleen is, or that of granulations; and it may be quickly and completely bleached with alcohol.

blood or blood-coloured serous fluids. The walls of most of the cysts were thin and pellucid; those of some were thicker, soft, and brownish-yellow, like the substance of some medullary cancers; a likeness to which was yet more marked in a small solid portion of tumour, which, though very firm, and looking fibrous, was pure white and brain-like.

None who examined this disease with the naked eye alone felt any doubt that it was an example of medullary cancer, with cysts abundantly formed in it. But, on minuter investigation, none but the elements which I shall presently describe as characteristic of the myeloid tumours could be found in it: these, copiously imbedded in a dimly granular substance, appeared to form the substance of the cyst-walls, and of whatever solid material existed between them. The white brain-like mass was, apparently, composed of similar elements in an advanced fatty degeneration; neither in it, nor in any other part, could I find a semblance of cancer-cells.

I have not seen another specimen deviating so far from the usual characters of myeloid tumours as this did; but I think that, as in this, so in any other variation of general aspect, the microscopic structures would suffice for diagnosis; for there is no other morbid growth, so far as I know, in which they are imitated. They consist essentially of cells and other corpuscles, of which the following are the chief forms:—

1. Cells of oval, lanceolate, or angular shapes, or elongated and attenuated like fibro-cells or caudate cells, having dimly dotted contents with single nuclei and nucleoli (fig. 31, A).

2. Free nuclei, such as may have escaped from the cells; and, among these, some that appear enlarged and elliptical, or variously angular, or are elongated towards the same

shapes as the lanceolate and caudate cells, and seem as if they were assuming the characters of cells.

3. The most peculiar form ;—large, round, oval or flask-shaped, or irregular cells and cell-like masses, or thin disks, of clear or dimly granular substance, measuring from $\frac{1}{300}$ to $\frac{1}{1000}$ of an inch in diameter, and containing from two to ten or more oval, clear, and nucleolated nuclei (fig. 31, B : see also fig. 33, p. 224).

Fig. 31.*

A B

Corpuscles such as these, irregularly and in diverse proportions imbedded in a dimly granular substance, make-up the mass of a myeloid tumour. They may be mingled with molecular fatty matter; or, the mass they compose may be traversed with filaments, or with bundles of fibro-cellular tissue and blood-vessels : but their essential features (and especially those of the many-nucleated corpuscles) are rarely obscured.

Respecting the general history of the myeloid tumours, the cases hitherto minutely observed are too few and too

* Fig. 31. Microscopic structures of myeloid tumours. A, elongated cells, or fibro-plastic cells (Lebert). B, a cluster of many-nucleated cells. Magnified about 350 times.

various to justify many general conclusions. Not that the disease is a rare one: for there can be little doubt that many cases recorded as examples of epulis, of fibrous tumours of the jaws, of osteo-sarcoma, and even of cancerous growths about the bones, should be referred to this group. At present, however, I can refer to no cases but those by M. Lebert, and those which I have myself been able to observe. From these, the most general facts I can collect are, that the myeloid tumours usually occur singly; that they are most frequent in youth, and very rare after middle age; that they generally grow slowly and without pain; and generally commence without any known cause, such as injury or hereditary disposition. They rarely, except in portions, become osseous; they have no proneness to ulcerate or protrude; they seem to bear even considerable injury without becoming exuberant; they may (but I suppose they very rarely) shrink, or cease to grow; they are not apt to recur after complete removal; nor have they, in general, any features of malignant disease.

I may illustrate these general statements by abstracts of some of the cases I have recorded; selecting for the purpose those which were, on any ground, the more remarkable.*

A lad, eighteen years old, was under Mr. Stanley's care, between five and six years ago, with a tumour occupying the interior of the symphysis, and immediately adjacent parts, of his lower jaw-bone. It had been observed gradually increasing for eight months without pain, and in its growth had disparted the walls of the jaw, hollowing out a cavity for itself, and projecting into the mouth through one of the alveoli. Mr. Stanley removed the portion of the jaw,

* The specimens obtained from all the following cases are in the Museum of St. Bartholomew's.

from the first left true molar to the first right premolar tooth. The tumour presented the greenish and greyish basis, blotched with crimson and various brownish tints, and the characters of firmness, succulency, and microscopic texture, which I have described as most distinctive of the myeloid tumours. It was the specimen from which some of the microscopic sketches were made, and might be considered typical. This patient is still in good health, with no appearance of return of the disease.

Mr. Lawrence had under his care a woman, twenty-one years old, with a tumour in the alveolar part of the front of the upper jaw. This was of about twelve months' duration, and had sometimes been very painful. It was seated in the cancellous tissue between the walls of the alveolar and adjacent portion of the upper jaw, projecting slightly into both the mouth and the cavity of the nose, and raising their mucous membranes after passing through the wasted bone. After cutting away the front wall of the jaw, the tumour was cleared out from all the cavity in which it lay imbedded. It was in all microscopic characters like that last mentioned, and resembled it in general features, except in that it had in every part the dark ruddy colour of a strong heart. The operation was performed two years ago, and there has been no reappearance of the disease, such as would have occurred in the case of a malignant tumour, if an attempt had been made to remove it without the bone in which it was growing.

A woman, 22 years old, was under Mr. Lawrence's care, in March 1851, from the alveolar part of whose right jaw, growths which were regarded as examples of epulis had been four times removed in the previous thirteen months. In the fourth operation, in August 1850, the growth was found to extend through the socket of the first molar tooth into the antrum, or into a cavity in the jaw. It was wholly removed (as it was thought), and the wounds healed soundly; but nine weeks afterwards a fresh growth appeared, that seemed to involve or arise from nearly the whole front surface of the right upper jaw-bone: it was firm, tense, and elastic, but not painful, projecting far on the face, as well as into the nostril, and into the cavity of the mouth at both the gum and the hard palate. This swelling, under various treatment, rapidly increased; and in December 1850, a similar swelling appeared at the left canine fossa, and grew at the same rate with that of earlier origin. Of course the coexistence of two such swellings led to the fear, and in some minds to the conviction, that the disease was cancerous; and the more, because, at nearly the same time with the second of these, two soft tumours had appeared on the parietal bones. Still, the patient's general health was but little impaired; and when the mucous membrane of the hard palate ulcerated over the most prominent parts of the tumours, neither of them protruded, or bled, or grew more rapidly.

In April 1851, the growth of the tumours appeared to be very much retarded, and for the next month was hardly perceptible; and the patient being very urgent that something should be done to diminish the horrible deformity of her face, Mr. Lawrence, in May, cut away the greater part of the front and of the palatine and lower nasal parts of the right upper jaw, and removed from the antrum all that appeared morbid, including, doubtless, nearly every portion of the tumour.

The excised portion of the jaw-bone was involved and imbedded in a large, irregularly spherical tumour, composed of a close-textured, shining, soft, and brittle substance, of dark greyish hue, suffused and blotched with various shades of pink and deep crimson. It was not lobed, but included portions of cancellous bone, apparently new-formed, and was very closely adherent to all the surrounding parts. To the microscope it exhibited all the characters that I have described above; and the many-nucleated corpuscles were remarkably well defined and full. They composed nine-tenths of the mass, and were arranged like clustered cells. The patient perfectly recovered from the effects of the operation; and, to every one's surprise, the tumour on the left upper jaw, which had been in all respects like that removed from the right side, gradually disappeared. It underwent no apparent change of texture, but simply subsided. The swellings on the parietal bones, also, the nature of which was not ascertained, cleared away; and when the patient was last seen, a few months ago, she appeared completely well, and no swelling could be observed.

No case could better show than this did the conformity of the myeloid tumours with the general characters of innocent growths: on the other hand, the following might well have been regarded as a malignant disease, if its structure and limitation to a single part had not been considered.

A farmer's boy, 15 years old, was under Mr. Stanley's care, in the winter of 1851, with a large tumour covering the upper part of his head, rising to a height of from one to two inches above the skull, extending nearly from ear to ear, and from the occipital spine to the coronal suture. This had been in progress of constant growth for three years, and was believed to have originated in the effects of repeated blows on the head. The head now measured 21 inches in circumference, and 16½ inches over its transverse arch. Just before his admission he had become blind in one eye, and nearly so in the other; his gait was unsteady; he had severe pains in and about the forehead, but his intellect was not affected, and he appeared in good general health. The scalp over the tumour was exceedingly tense, and, at the most prominent part, rather deeply ulcerated. The temporal and occipital arteries were very large and tortuous: the corresponding veins felt like large sinuses.

In the last two months of his life, while in the hospital, his blindness became complete; he lost nearly all power of hearing, and suffered severe paroxysms of headache. A large portion of the scalp and of the subjacent tumour sloughed, leaving a great suppurating cavity, in the still growing tumour. At length, two days before death, convulsions ensued, which were followed by coma; and in this he died.

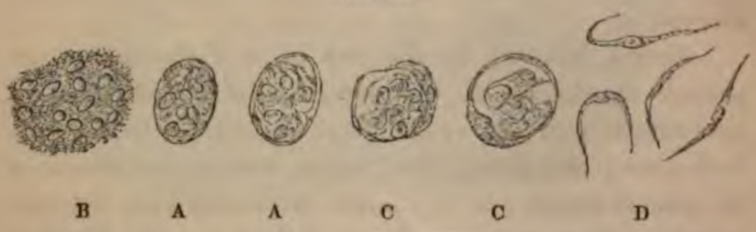
FIG. 32.

The tumour covered all the surface of the skull in the extent above mentioned, rising gradually from its circumference to a height of two inches at and about its central parts. A similar growth of somewhat less dimensions existed within the corresponding parts of the interior of the skull, included the dura mater and longitudinal sinus, and deeply impressed the cerebrum. And, again, material similar to that forming these growths was infiltrated in and expanded the included parts of the bones of the vault of the skull. From both surfaces of these bones osseous spicula and thin lamellæ extended into the bases of the corresponding parts of the tumour. The adjacent sketch (Fig. 32), from the preparation in the Museum of St. Bartholomew's, shows the relations of this singular growth to the skull and brain, as seen in a transverse section.

The extra-cranial portion of the tumour had a nearly uniform dense and elastic texture, of dull yellow colour, mingled with white. Its cut surface appeared smooth, without distinct fibrous or other structure, and to the unaided eye looked like the firmest medullary cancer, involving the pericranium, and partially exposed by ulceration of the scalp. The intra-cranial portion was soft, easily crushed and broken into pulp, purple, streaked with pale grey and pink tints. It looked obscurely fibrous, and was intersected by shining bands derived from the dura mater and falx involved in it. To the naked eye it was like a softer medullary tumour, and was closely connected with the impressed surface of the brain, in the substance of which, just beneath it, was a large abscess.

Different, however, as the two parts of the tumour appeared, there was no corresponding difference in their microscopic elements; these were essentially the same in both parts; and though the tumour was so like cancer in its general aspect, yet its minute structures were not cancerous. They were chiefly as follows: —(1) Regular, oval, and well-defined cells, about $\frac{1}{500}$ of an inch in diameter, containing dimly-granular or dotted substance, in which many oval nucleolated nuclei were imbedded (Fig. 33, A). They corresponded exactly with the corpuscles characteristic of the myeloid tumours; but they had more distinct cell-walls than I have seen in any other case, and some had even double contours, as if with very thick cell-walls. (2) Irregular masses or fragments, of various sizes and shapes, having the same apparent substance as the contents of the cells, and containing similar numerous imbedded nuclei, but no defined cell-walls (Fig. 33, B). In these also, the identity with the constituents of myeloid tumours was evident. (3) More abundant than either of these forms were bodies like the many-nucleated cells, but having on their walls, as it were wrapped over them, one or more elongated caudate nucleated cells (C). They seemed to be formed like the peculiar corpuscles in epithelial cancers, in which one finds cells or clusters of nuclei invested with layers of epithelial scales concentrically wrapped round them. Their borders presented two or three concentric lines, as if laminated; between these were one or more nuclei; and often the innermost of the lines was bayed inwards towards the cell-cavity, leaving a space in which a nucleus was lodged. Sometimes, from the circumference of such bodies, one could find curved nucleated elongated cells dislodged (D).

FIG. 33.*



In most instances these laminated cells were filled with the dimly-granular substance and the many nuclei; but in some there were clear spaces, that seemed to contain only pellucid liquid. The elongated cells that could be sometimes detached from these laminated cells agreed, in general characters, with the remaining principal constituent of the growth; namely, (4) narrow, long, caudate, and fusiform

* Fig. 33. Microscopic elements of the myeloid tumour of the skull, described in the text. Magnified 350 times.

cells with out-swelling nuclei, like those of developing granulations, and such as I have described as constant elements of the myeloid tumours.

All the minute structures just described were found closely compacted, and making, with free nuclei and granular matter, up the mass of both portions of the tumour; and the only apparent difference was, that, in the intra-cranial portion, they appeared more generally to contain granules, and to be mixed with granule-cells and granule-masses, as if this part of the tumour were more degenerate than the other.

I fear that even so abbreviated a record of this case as I have ventured to print may seem very tedious; but it is not for its own rarity alone that the case is important. It would be difficult to find a tumour more imitative of cancer than this was in its mode of growth, its infiltration of various tissues, its involving of important parts, its apparent dissimilarity from any natural structures. And yet it certainly was not cancer; the microscopic elements were like those of natural parts: not a lymphatic or any other organwas affected by similar disease, and death seemed to be due solely to the local effects of the growth.

But while these, and many other cases, may be enough to prove that the myeloid tumours are generally of innocent nature, yet I suspect cases may be found in which, with the same apparent structures, a malignant course is run. Of such suspicious cases, the two following are examples:—

A woman, 50 years old, was under Mr. Stanley's care, in 1847, with an irregular, roundish, heavy tumour, between two and three inches in diameter, in her left breast. It projected in the breast, and the skin over it was red nad tense, and at one part seemed to point, as if with suppuration. Some axillary glands were enlarged, but not hardened.

This tumour had existed about nine months, had been the seat of occasional pain, and was increasing. It was considered to be hard cancer; but, on the removal of the breast, was found to be a distinct growth, completely separable from the mammary gland, which was pressed aside by it. Its character was obscured by suppuration in many points of its substance; yet, after a careful examination of it in the recent state, and a repeated examination of the notes and sketches that I made of its structure, I can only conclude that it was a myeloid tumour suppurated, or, possibly, mingled with cancer.

Eighteen months after the removal of her breast, this patient returned to the hospital, with a large ulcerated tumour in the lower part of her left axilla, which had begun to form as a distinct tumour six months after the operation. This was like a large flat ulcerated cancer: it often bled freely. Her general health was deeply affected by it, and she died in two or three months after her re-admission.

The malignant character manifested in this case was yet more decidedly marked in another. A man, 53 years old, of healthy appearance, was under Mr. Lawrence's care with an oval tumour, extending, under the mastoid muscle, from the angle of the jaw to the clavicle. Bloody serum oozed from it through three small apertures in the integuments. The anterior part of the tumour felt as if containing fluid; the posterior part felt solid, firm, and elastic. He had observed this tumour for ten months, having found one morning, when he awoke, a lump nearly as large as an egg, which regularly increased. In two months it had become very large: it was punctured, and about one-third of a pint of reddish serum was discharged from it. In the succeeding eight months it was tapped thirty-four times more, about the same quantity of similar fluid being each time evacuated. It was also six times injected with tincture of iodine, twice traversed with setons, and in various other ways severely treated. The only general result was, that it increased, and seemed to become, in proportion, more solid. When admitted under Mr. Lawrence, all the parts over the tumour were extremely tense and painful, and cerebral disturbance appeared to be produced by its pressure on the great blood-vessels of the neck. It was freely cut into, and the surface which was exposed presented well-marked characters of the myeloid tumours such as I have described. Some small portions that were removed enabled me to confirm this with the microscope. The elongated, and the many-nucleated cells, were, to all appearance, decisive. The incision of the tumour produced temporary relief; but the tumour continued to grow, and death occurred nearly twelve months from its commencement. In examination after death, the solid portion of the tumour formed five-sixths of its bulk, the rest consisting of a suppurating cavity. The microscopic characters of the solid part were exactly like those of the portions removed during life, though the substance appeared firmer and whiter than before, and yielded, when scraped, a creamy fluid. Four small masses of similar substance were found in the lungs; and a similar material was diffused in one cervical gland.

Now, in both these cases, and especially in the last, the whole history of which seems full of anomalies, there were certainly such features of dissimilarity from the usual general characters of the myeloid tumours, that, although the microscopic characters appeared identical, yet they are not enough to prove even the occasional malignancy of the disease: they are enough to make us cautious; enough to induce us to study this disease very carefully, as one of those that may, in different conditions, or in different persons, pursue very different courses; appearing in some as an innocent, in others as a malignant disease. The use of such terms as "semi-malignant," "locally malignant," "less malignant than cancer," and the like, in relation to growths of this kind, involves subjects of singular interest in pathology, as well as in practical surgery. But I will not now dwell on them. The whole subject may be more appropriately discussed in the lectures on malignant tumours.

LECTURE VIII.

PART II.

OSSEOUS TUMOURS.

Much of the general pathology of osseous tumours has been considered in the last two lectures, which have treated of the tumours composed of rudimental bone-textures. Ossification may ensue in either a cartilaginous or a myeloid tumour. In the latter it is rarely, if ever, more than partial, in the former it may be complete ; and the cartilaginous may be transformed into an osseous tumour. The name of osseous tumour is, however, not usually applied to those in which ossification is in progress. It is reserved for such as are formed wholly of bone: and of these alone I shall now speak.

Osseous tumours, even more generally than cartilaginous, are connected with the bones, with which, moreover, though they may have the other characters of tumours, they are almost always continuous, after the manner of outgrowths. They are, however, occasionally found in soft parts, as distinct and discontinuous tumours, invested with fibro-cellular capsules. Thus in the College-Museum (No. 203), is a small, completely osseous tumour, formed of soft cancellous tissue with medulla, which lies over the dorsal surface of the trapezial and scaphoid bones, completely isolated from them and all the adjacent bones. In the Museum of St. George's Hospital is a tumour formed of compact bony tissue, which lay over the palmar aspect of the first metacarpal bone, loosely imbedded in the fibro-cellular tissue, and easily separated from the flexor tendons of the finger.* It had been growing five years in a middle-aged woman. So, but rarely and imperfectly, the cartilaginous tumours over the parotid gland are ossified ;† and those in the lungs‡ and testicle.

At present, these isolated osseous tumours are interesting for little more than their rarity. It is to those connected with bones that I must now particularly address myself.

I have already said that these have the character of continuous growths; that they are like outgrowths rather than tumours. And it is not easy to draw any line of distinction between what deserve to be considered as tumours, and such accumulations of bone as may ensue in consequence of superficial inflammation, or other disease, of the bone or periosteum. The exostoses and hyperostoses of nosology are not to be severally defined without artifice; but, in general, we may take this as a convenient, and perhaps a just, method of dividing them: namely, that those may be reckoned as osseous tumours, or outgrowths of the nature of tumours, whose base of attachment to the original bone is defined, and grows, if at all, at a less rate than their outstanding mass.§ Those which are not of the nature of tumours are generally not only ill-defined, but widely spread at their bases of attachment; and the additions made to them increase their bases rather than their heights or their whole masses.

* An account of it is reported in the Medical Times, Aug. 3, 1850.

† Mus. Coll. Surg. No. 204.

‡ Museum of St. Thomas's Hospital.

§ Mr. Stanley particularly remarks this in relation to operations for removal of exostoses (On Diseases of the Bones, p. 150).

Of osseous tumours, thus roughly defined, two chief kinds may be observed; namely, the cancellous, and the compact or ivory-like, which, speaking generally, may be said to resemble respectively the medullary tissue, and the walls or compact substance, of healthy bone. In both alike, the bone is usually true and good bone. By my own observations of it I know no more than this; but Mr. Quekett, who has submitted to microscopic examination portions of all the osseous tumours in the College-Museum, confirms the general statement in all particulars. In different specimens there may be varieties in the proportion and arrangement of blood-vessels, and in the size and development of the bone-corpuscles or lacunæ and their canals; but the proper characters of the bone of the species in which the tumour occurs are not far departed from.

I believe the homology of the osseous tumours is, in chemical qualities, as perfect as it is in structure; and that, as with the natural bones, so with these, we may not ascribe differences of hardness or density to the different proportions of the organic, and of the saline and earthy components; but to the different manner in which the similar material that they compose is, in different specimens, compacted. Their varieties of hardness depend on mechanical rather than on chemical differences.

Of the general methods of ossification of cartilaginous tumours I spoke in my last lecture, and then noticed that in nearly all cases when the ossification of the tumours is completed, they consist of a very thin layer or wall of compact tissue, covering-in a mass of cancellous and medullary substance: and thus they are composed, whether the cartilage-growth began within or upon the bone. It is probable that, in some instances, the hardest osseous tumours may be also formed by transformation of cartilage into bone. Thus, an exceedingly hard ivory-like tumour at the angle of the lower jaw, in the Museum of the College,* has so exactly the nodular and irregularly spheroidal shape belonging to cartilaginous tumours, and to the rare cancellous bony tumours in the same part, that we can scarcely doubt it had a primordial cartilaginous condition. So, too, Professor Goodsir tells me, there is in the Museum of the University of Edinburgh a tumour of the humerus, half of which is as hard and compact as ivory, and half is cartilaginous. In the Museum of Guy's Hospital there is a somewhat similar specimen: in which, however, the hardness of the bone may be due to inflammatory induration of an ordinary cancellous osseous growth.

These, however, are probably exceptions to the general rule concerning the compact or ivory exostoses; for, for the majority of these, Rokitansky says truly that no preparatory cartilage is formed. As, in the natural ossification of the skull, the bone is formed, not in a matrix of cartilage, but in fibrous tissue, layers of which are successively ossified, so probably are the hard bony tumours of the skull formed.

The general characters of the cancellous bony tumours are so nearly described in the account of the cartilaginous tumours from which they commonly originate, that I need only briefly refer to them. They usually affect a round shape, with projecting lobes or nodules, which answer to those of the conglomerate cartilaginous tumours, and are often pointed or angular. They may, however, be very smooth on their surface, whether they have grown within bones, whose extended walls form now their outer layer, or

* No. 1035: it may be compared with a cancellous tumour of the same form, in the Museum at St. George's Hospital, removed by Mr. Tatum.

without them under the periosteum. When completely ossified, their respective tissues, compact and medullary, are usually continuous with those of the bone on which they are planted; and the later periods of growth seem attended with such mutual adaptation as may tend towards making one continuous, though deformed, mass of the old and the new bone.

The singularities of position in which the osseous tumours may be found, and the important hindrances that may result from their interference with adjacent parts, I need not detail; they are amply enumerated by Mr. Stanley.

Of their rates of growth little is known; but I believe that when a cartilaginous tumour is completely ossified, the growth of the bony tumour is extremely slow. However, osseous tumours may be found of an enormous size. The largest that I know is in the Museum of the College.* It nearly surrounds the upper two-thirds of a tibia, in an irregularly oval mass, with a nodulated surface, almost entirely covered-in by a thin layer of compact tissue, and cancellous in all its interior. It measures exactly a yard in circumference, and the limb, which was amputated by Mr. Gay, a former surgeon of St. Bartholomew's Hospital, weighed forty-two pounds.

Another tumour of large size is in the Museum of the same Hospital.† A great nodulated mass of bone is attached to the ischium and pubes, and formed part of a tumour of which the rest was nodulated cartilage.

The compact, hard, or ivory-like bony tumours occur, especially, about the bones of the head, and present several diversities of form. Some are uniform and simple; others

* No. 3220. It is engraved in Cheselden's Osteographea, Tab. 53, f. 1, 2, 3. A painting of it is in the St. Bartholomew's Museum.

† Series 1 A. No. 133; and Series 1, No. 118.

variously lobed, or nodular. The simple tumours are commonly attached to the skull by narrowed bases, over which their chief masses are prominent on one side, or all round. A good specimen of this kind is in the Museum of St. Bartholomew's Hospital,* which shows, besides, that these tumours may consist of an exterior hard, and interior cancellous, tissue, respectively resembling and continuous with the outer table and the diploe of the skull. Some of these hard tumours have the shape of biconvex lenses, resting with one convex surface on the skull; and of such as these more than one may be found on the same skull.†

A disease much more formidable than these exists in the nodulated and larger hard osseous tumours connected with the bones of the skull. These are not like outgrowths from the outer table and diploe; for they often, or I believe usually, grow first between the tables of the skull, or in the cavities of the frontal or other sinuses. Increasing in these parts, they may tend in every direction, penetrating the tables of the skull, and forming largest masses, projecting as much into the interior of the skull as on its exterior.

The most frequent seat of such tumours is in the frontal bone, especially about its superciliary and orbital parts; and they are horrible by their pressure into the cavities of both the cranium and the orbit, compressing the brain, and protruding one or both eyes.

The characters of the disease, so far as the growth is concerned, are well shown in a huge mass which grew from the forehead of an ox, originating apparently in the frontal sinuses.‡ It is like a great spheroidal mass of ivory, measur-

* Series 1, 71. Series 1 A. 124 in the same Museum, and No. 3215 in the Museum of the College, are nearly similar specimens.

† Mus. Coll. Surg. 793. See also Miller's Principles of Surgery, p. 476.

‡ Mus. Coll. Surg. 3216.

ing 8½ inches in diameter, and weighing upwards of sixteen pounds. Its outer surface, though knobbed and ridged, is yet compact, like an elephant's tusk; and, in similar likeness, its section shows at one part a thin investing layer, like the bone covering the ivory. It is nearly all solid, hard, close-textured, and heavy; only a few irregular cavities, and one with smooth walls, appear in its interior, and you may trace the orifices of many canals for blood-vessels. Mr. Quekett found that this tumour had a higher specific gravity than any bone, except that which is found in what are called the porcellaneous deposits, or transformations, in the heads of bones affected with chronic rheumatism. But it has in every part the structure of true bone.

Just like this, in the general characters of their tissue, are the hard bony tumours from the human frontal bone. In one, an Hunterian specimen,* such a tumour, 2½ inches in diameter, deeply lobed and knotted, fills the frontal sinuses and the upper part of the left orbit, encroaches into the right orbit, and projects for nearly an inch on both the surfaces of the skull. It appears to have originated in the ethmoidal or frontal cells, and, in its growth, to have displaced and destroyed by pressure the adjacent parts of the tables of the skull and the wall of the orbit. It is, for the most part, as hard as ivory, but in its central and posterior portion is composed of very close cancellous tissue.

A specimen, far surpassing this in size, but resembling it in all its general characters and relations, is in the Museum of the University of Cambridge, and is represented in Fig. 34. It is the largest and best specimen of the kind that I have seen, and its osseous structure is distinct; only,

* Mus. Coll. Surg. 795. It is engraved in Baillie's Morbid Anatomy, Fasc. x. pl. 1, fig. 2; and in Home, Philosoph. Trans., vol. lxxxix. p. 239.

as Professor Clark has informed me, it is irregular: in the hardest parts there are neither Haversian canals nor lacunæ; in the less hard parts, the canals are very large, and the lacunæ are not arranged in circles around them; and everywhere the lacunæ are of irregular or distorted forms.

FIG. 34.*

A smaller specimen is in the Museum of St. Bartholomew's Hospital. A girl, twenty years old, was admitted with protrusion of the left eye-ball, which appeared due to an osseous growth projecting at the anterior, upper, and inner part of the orbit. None but the anterior boundaries of this growth could be discerned. It had been observed protruding the eye for three years, and had regularly increased; it was still increasing, and produced severe pain in the eye-ball, and about the side of the head and face. It seemed, therefore, necessary to attempt the removal of the tumour, or at least to remove some part of it, with the hope that the disturbance of its growth might lead to its necrosis and separation. A portion of it was with great difficulty sawn off; but the patient died with suppuration in the membranes of the anterior part of the cerebrum.

Now all these cases, corroborated as they are by others upon record, prove the general character and relations of these

* Fig. 34. Hard bony tumour of the skull: from the Cambridge University Museum.

tumours. Their nodular form, and uniform hard, ivory-like texture; their growth in the diploe or sinuses, as isolated or narrowly attached masses; their tendency to extend in all directions; their raising and penetrating the bones of the skull, and growing into the cavities of the skull and orbit; all show the exceeding difficulty and peril of operations on them. The simpler kinds, that only grow outwards, may indeed be cut off with advantage, though seldom without great difficulty; and, often, the attempt to remove them has been made in vain; but these larger and nodular tumours about the brow can very rarely be either cut off or extirpated.*

The extirpation, however, which may be impossible for art, is sometimes effected by disease: these tumours are occasionally removed by sloughing. Such an event happened in a case related by Mr. Hilton;† and the great ivory-like mass, clean sloughed-away, is in the Museum at Guy's. So, too, in a case by Mr. Lucas, a bony tumour at the edge of the orbit, after growing eight months, was exposed by an incision through the upper eyelid. The wound did not heal; the tumour continued to grow; and, twelve months afterwards, it became "carious," and was detached. The course of treatment which these cases suggest has been, I believe, the only one worth imitation; namely, exposure of the tumour, and application, if need be, of escharotics to the surface of the bone.

These hard osseous tumours are very rarely found in connection with any bone but those of the skull. In the College-Museum, however, is a well-marked specimen in

* The histories of some specimens in the Museum of St. George's Hospital illustrate these statements very well. See, also, Mr. Hawkins's Lectures (Med. Gaz., vol. xxi.)

† Guy's Hospital Reports, vol. i.

the lower jaw; a nodulated mass, nearly three inches in diameter, invests the right angle of the jaw, and is, in its whole substance, as hard and heavy as ivory. I have already, also, referred to cases of similar hard tumours on the humerus: but they are extremely rare.

Osseous tumours of the lower jaw appear to be less rare in animals inferior to man; for the College-Museum contains three specimens,* taken respectively from a Virginian opossum, a cat, and a kangaroo; and, which is more singular, one from a cod-fish. In this specimen,† a disk-shaped mass of bone, two inches in diameter, extremely heavy and compact, is attached to the inner surface of the superior maxillary bone.

In the texture of these very hard bony tumours connected with the bones of the skull and the lower jaw, we may observe an instance of the general rule of likeness between tumours and the parts most near to them; for their bone is like no other natural bone so much as the internal table of the skull, or the petrous bone, or inferior maxilla.

The same likeness is observable in the osseous tumours that are frequent on the last phalanx of the great toe, which, alone, now remain for me to speak of.‡

No adequate explanation, I believe, can be offered for the occurrence of these growths. They may be sometimes referred to injury; yet the effects of injury to the great toe are so inconstant, that we cannot refer to injury, as other than an indirect cause of the growth of tumours, so singularly constant as these are in all their characters, and so nearly without exception limited to the one toe of all that are ex-

* Nos. 1036-7-8.

† No. 1039. A similar specimen is in the Museum of the Boston (U.S) Medical Society.

‡ Mus. Coll. Surg., 787-8-9, 790.

posed to injury. They grow almost always on the margin, and usually on the inner margin, of the end of the last phalanx of the great toe; in only one specimen have I seen such a tumour springing from the middle of the dorsal surface of the phalanx; and, in only two, similar tumours from the last phalanx of the little toe. Growing-up from the margin, they project under the edge of the nail, lifting it up, and thinning the skin that covers them, till they present an excoriated surface at the side of the nail. Their growth is usually very slow, and when they have reached a diameter of from one-third to one-half of an inch they commonly cease to grow, and become completely osseous. They are among the tumours whose independence is shown not only by abnormal growing, but by the staying of their growth when they have attained a certain natural stature.

I believe that they are not uniform in their method of development. In some specimens I have seen no cartilaginous basis; the bone appeared to form in fibrous tissue, as it were following, and at length overtaking, the fibrous growth. In another, the outer part of the tumour was formed of a thin layer of fibrous tissue, and between this and the growing bone was a layer of cartilage, which had externally the stellate nuclei, and internally the nuclei of ordinary form, among which the processes of bone were extending.

Whichever way the bone is formed, it is, like that of the phalanx itself, cancellous but very hard, and with small spaces, and comparatively thick cancelli or laminæ bounding them. The outer layer, too, is rough and ill-defined, so that the growth looks like a branch from the phalanx, and, like a branch, is apt to sprout again when cut away, unless at least the end of the bone on which it grows be removed with it.

The account of osseous tumours would be very incomplete, if there were not added to it some notice of those growths which are most like them, though they may lie beyond the range of any reasonable or convenient definition of tumours. Among these are certain growths of the bones of the face, tumour-like in their most prominent parts, and yet unlike tumours in that their bases of connection with the bones are very ill-defined, and that from their bases the morbid changes in which themselves originated extend outwards, on the same or even to other bones, gradually subsiding. In no instances can it be plainer than it is in these, that a nosological boundary of "Tumours" must be an arbitrary one.

Such growths as these are not very rare in the superior maxillary bone. Its ascending process may become enlarged and prominent, with an ill-defined hard swelling, very slowly increasing, and sometimes stopping short of any considerable deformity. But a much more formidable disease exists when a large portion of the bone, or the whole antrum, is involved; especially, because this is apt to be associated with diseases in the adjacent bones.

An extreme case is shown in a specimen in the College from the Museum of Mr. Langstaff.* Two large masses of bone, of almost exactly symmetrical form and arrangement, project from the upper jaws and orbits, and have partially coalesced in the median line. They are rounded, deeply-lobed, and nodular; nearly as hard and heavy as ivory: perforated with numerous apertures, apparently for blood-vessels. They project more than three inches in front of the face, and an inch on each side beyond the malar bones; they fill both orbits, the nasal cavities, and probably the antra, and they extend backwards to the pterygoid plates. Part of the septum of the nose, and the alveolar border of the jaw, are almost the only re-

* Mus. Coll. Surg. 3236, A.

maining indications of a face. The disease appears to have begun in the superior maxillary bones, and thence to have spread over the bones of the face; similar disease, in a less degree, existing in the bones adjacent to the chief outgrowths.

The patient, who was sixty years old, believed the disease had been eighteen years in progress, and ascribed it to repeated blows on the face. He suffered much pain in the face, eyes, and head. His eyes projected from the orbits: the right, after suppuration and sloughing of the cornea, shrivelled; the left was accidentally burst by a blow. During the last two years of his life he occasionally showed symptoms of insanity, and at last he died with apoplexy of the cerebral membranes.

The disease very rarely attains so horrible a state as is here shown. More commonly it is almost limited to the antrum. In this case it may exist with little deformity. In the Museum of St. Bartholomew's Hospital, (i. 62,) is a specimen in which both the antra appear nearly filled by the thickening and in-growing of their walls; only small cavities remain at their centres. The new bone is hard, heavy, and nearly solid; yet it is porous or finely cancellous, and is neither so compact nor so smooth on its cut surface as that of the "ivory exostosis." The same disease is manifest in a less degree upon the outer surfaces of the maxillary bones, and on the septum and side-walls of the nose.

The disease has a manifest tendency to concentrate itself in the maxillary bones; so much so, that if a case be met with where only one of these bones is diseased, it may be removed with a fair prospect that the disease will not make progress in the adjacent parts. I believe, indeed, that this has been done, with a satisfactory result, in a case where already slight increase of some of the bones near the maxillary was observable: and there was good reason to anticipate the same result in a case on which Mr. Stanley operated. The patient was a girl, 15 years old, in whom enlargement of the nasal process of the superior maxillary bone had been observed for eight years, and was still increasing. It had as yet produced no pain, and no deformity of the cheek, the orbit, or the palate: but it was regularly increasing; and as it could be certainly expected to increase even more in width of base than in prominence, (this being the common tendency of the disease,) it was thought right to remove the superior maxillary bone while yet the disease was limited to it. The patient died, ten days after the operation, with erysipelas. The specimen displays exactly the same disease as do those last described.

Now it sometimes happens that growths like these spontaneously perish, are separated with the ordinary phenomena of necrosis, and thus are naturally cured. Such an event was observed in a case under the care of Mr. Stanley.

A man, 37 years old, was admitted with a slight convex smooth prominence of the nasal process of his right superior maxillary bone, which he had observed increasing for two years, but which of late had not increased or given him any inconvenience. Indeed, he came to the hospital not for this, but for a swelling of the right gum and the mucous membrane of the hard palate, through fistulous openings in which one could feel exposed dead bone. These had existed for a month. The swelling of the nasal process was so characteristic of the disease I am describing, as to suggest, at once, the existence of such a growth; but the suppuration and necrosis threw obscurity on the case; and it was only watched and treated according to such indications as arose, till, after four months, the whole of the mass of bone with which the antrum had been filled up was separated and pulled away.

The appearance of the sequestrum, a nearly spherical mass of hard, heavy, and finely cancellous bone, an inch or more in diameter, leaves no doubt of the nature of the disease.* The great cavity which remained, opening widely into both the mouth and the nose, gradually contracted, or was filled up, and the man recovered perfectly.

A similar event, I imagine, happened in a man who exhibited himself at most of the hospitals in London, two years ago, with a great cavity where all his right upper jaw bone and his turbinated bones had once been, and through which one could see the movements of his pharynx and palate. This he said had been left after the separation of a great tumour of bone.

The growths of this kind seem to merge gradually into elevations of cancellous porous bone, which may be found on various parts of the bones of the skull, but of the exact pathology and relations of which we have, I believe, no clear knowledge. Specinens of them are in the Museum of the College, and the Museum of St. Thomas's Hospital is peculiarly rich in them. In some there are great thickenings of one or both tables of the skull, raising up bosses of new bone from half an inch to an inch in depth, on one or both the parietal bones, or on the occipital or frontal. In some, all the bones of the face are involved in similar changes. In some, similar elevations are produced by growth of bone between the tables of the skull, which themselves remain healthy. But, as yet, I believe, we can only look at these as strange and uninstructive things.

* The specimen is in the Museum of St. Bartholomew's Hospital.

The last form of bony growths that I shall mention comprises the instances in which numerous exostoses occur in the same patient, and the examples of what has been called the ossific diathesis or dyscrasia. In the large majority of cases, both cartilaginous and osseous tumours occur singly: a few exceptions might be found among such as I have been describing, yet the rule is generally true. But in certain instances a large number of the bones bear outgrowths which, at least in external shape, are like tumours. These are commonly regarded as of constitutional origin. Some, indeed, appear to be so in that sense of constitutional disease, which implies a local manifestation of some morbid condition of the blood; but others can be so called only in that sense, by which we intend some original and inborn error of the formative tendency in certain tissues or organs.

Of these last we may especially observe that the tendency to osseous overgrowths is often hereditary, and that its result is a symmetrical deformity. A boy, six years old, was in St. Bartholomew's Hospital, five years ago, who had symmetrical tumours on the lower ends of his radii, on his humeri, his scapulæ, his fifth and sixth ribs, his fibulæ, and internal malleoli. On each of these bones, on each side, he had one tumour: and the only deviations from symmetry were that he had an unmatched tumour on the ulnar side of the first phalanx of his right forefinger, and that each of the tumours on the right side was rather larger than its fellow on the left.

I saw this child's father, a healthy labouring man, 40 years old, who had as many or even more tumours of the same kind as his sons; but only a few of them were in the same positions. All these tumours had existed from his earliest childhood; they were symmetrically placed, and ceased to grow when he attained his full stature: since that time they had undergone no apparent change. None of this man's direct ancestors, nor any other of his children, had similar growths; but four cousins, one female and three male, children of his mother's sisters, had as many of them as himself.

The swelling on the little boy's forefinger was an inconvenience to him, and at his parents' request Mr. Lloyd removed the finger. The swelling consisted of an outgrowth or projection of healthy-looking cancellous bone, full of medulla, and coated with a thin layer of compact tissue; its substances being regularly continuous with those of the phalanx itself.

Many similar cases of symmetrical and hereditary osseous outgrowths might, I believe, be adduced;* and all their history suggests that they are to be regarded as related not less closely to malformations, or monstrosities by excessive development, than to the osseous tumours or outgrowths of which I have been speaking. Indeed, at this point the pathology of tumours concurs with that of congenital excesses of development and growth.

We must distinguish from these cases the instances of multiple ossifications of tendons, muscles, and other tissues, that are occasionally met with; for these only imperfectly imitate the forms of tumours, and are probably connected with such a morbid condition of the blood as really may deserve the name of ossific dyscrasia or diathesis.

Before ending, it may be proper to point out the chief distinctions between the osseous tumours, and those growths which are connected with other tumours springing from

* See Mr. Stanley's Treatise on Diseases of Bones, p. 152; and Mr. Hawkins's Lectures on Tumours of Bones (Medical Gazette, vol. xxv. p. 474).

the bones; for, under the vague name of osteo-sarcoma, many include together, and seem to identify, all growths in which bone is mingled with a softer tissue.

The growths that may chiefly need distinction are those of osteoid cancers, and the bony skeletons of certain medullary tumours of bone. Osteoid cancers are probably examples of firm, or hard, or fibrous cancers, ossified: and the best marked among them present an abundant formation of peculiarly hard bone. The distinctions usually to be observed between these hard osteoid cancers and the hard osseous tumours are mainly in these particulars:—(*a*) the osteoid mass, in its mid-substance, may be compared with chalk, the osseous with ivory; the one is dull and powdery, the other bright and wholly void of friability; (*b*) the osteoid is new bone infiltrated, as it were, in some softer tissue, or in the tissues of the original bone, which disappear as it increases; the hard osseous tumour is a distinct growth, attached in a comparatively small part of its extent to the bone on which it grows; (*c*) the outer surface of an osteoid growth is porous and rough, and, if laminated, its laminæ have their edges directed outwards; while the outer surface of a hard osseous tumour is smooth and compact, and, if laminated, the surfaces of its laminæ are directed outwards; (*d*) lastly, the minute characters of bone are far less perfect in the osteoid than in the osseous growth: bone-corpuscles existing, indeed, but small, round, irregular, with very small, if any, canaliculi, and imbedded in a porous, chalky-looking, basis substance.

And, 2dly, for distinction between the softer osseous skeletons of medullary cancers, and the cancellous osseous tumours, we may chiefly observe that, (*a*) the bone in cancers is more dry and friable than the cancellous bone of the osseous tumours; and (*b*) the bone in cancerous growths has no medulla, the interspaces between its laminæ being filled with cancerous matter; while medulla is a constant constituent, I believe, of all the cancellous osseous tumours.

Such are the chief differences generally to be observed between the bone of innocent and that of malignant tumours; differences which it is well to establish, since the fact is sufficiently confusing, that any normal tissue should be formed in subordination to the growth of cancers. The subject will be again adverted to in the lecture on Osteoid Cancer.

LECTURE IX.

PART I.

GLANDULAR TUMOURS. Adénoïde —

We may call those tumours "glandular" which, in their structure, imitate the glands; whether the secreting glands, or those organs which we name glands, because, though having no open ducts, they are of analogous structure.

The most frequent example of these glandular tumours is the kind which imitates, and occurs in or near, the mammary gland; the chronic mammary tumour of Sir A. Cooper; the pancreatic tumour of Mr. Abernethy;* the fibrous tumour of the breast of M. Cruveilhier.† Other tumours of the same general kind are more rarely found in the lips, and in or near the prostate and the thyroid glands. Probably, too, some other tumours, to which no name, or a wrong one, has been hitherto assigned, may yet have to be placed in this group: indeed, I think it nearly certain that there are lymphatic gland-growths, which we usually regard as enlarged glands, but which are really new growths, of the nature of tumours, even in the most limited sense of the term. At present, however, I will have in view only such

* The mammary tumour described by Mr. Abernethy was probably a medullary cancerous disease.

† Anatomie Pathol. liv. xxvi. pl. 1; and Bulletin de l'Académie de Médecine, t. ix. p. 429.

gland-tumours as may be clearly recognised; namely, such as the mammary glandular tumour, the labial, the prostatic, and the thyroid.

Some of the pathology of these tumours has been already sketched in the account of the glandular proliferous cysts (p. 8 and 65). To that account I may again refer, so far as to the point at which it is believed that an intra-cystic growth has completely filled the cyst in which its growth began, and has coalesced with the walls, so as to form a solid tumour (p. 67).

Now it is perhaps probable that all glandular tumours may be formed after this plan: for, in those occurring in the breast, we find sometimes one circumscribed mass, composed, half of a proliferous cyst, and half of a solid glandular tumour;* sometimes two such growths lie apart, yet in the same gland (Fig. 6); and often, we find such structures as we doubt whether to call proliferous cysts nearly filled, or mammary tumours (Fig. 8).

However, if all the mammary and other glandular tumours are thus of intra-cystic origin, it must be admitted that many of them very early lose the cystic form, and continue to grow as solid masses; for we find them solid even when they are very small; and they are traced growing from year to year, yet apparently maintaining always the same texture.

I shall speak now of the solid tumours alone; and, first, of the Mammary Glandular Tumours.

Sir Astley Cooper may be said to have had a good insight into their nature, when he called them "chronic mammary," and said they were "as if nature had formed

* Mus. Coll. Surg., 177-8.

an additional portion of breast, composed of similar lobes."* The analogy of their structure was also recognised by Mr. Lawrence.† But I believe nothing more than this general likeness had been observed, till these tumours were examined with the microscope by M. Lebert,‡ who found in them the minute glandular structure imitative of the mammary gland, and recognised many of their relations to the proliferous cysts. Mr. Birkett,§ by independent and contemporary observations, made on the great collection of these tumours in Guy's Hospital, confirmed and extended the conclusions of M. Lebert, and has cleared-up much of the obscurity that existed previous to his inquiries. Both these gentlemen apply such terms as "Imperfect Hypertrophy of the mammary gland" to these tumours: but, highly as I esteem their observations (and not the less, I hope, because they corrected errors of my own‖), I would rather not adopt their nomenclature, since, if we do not call these "tumours," I hardly know to what innocent growths the term could be applied. Nearly all innocent

* On Diseases of the Breast, p. 54.

† On Tumours; in Med.-Chir. Trans., vol. xvii. p. 29. It seems only just to observe that this recognition of the obvious resemblance between the structure of these tumours and that of the mammary gland was almost always sufficient, after the description by Sir A. Cooper, to enable the surgeons of this country to avoid the confusion between the "chronic mammary" tumours and the cancers of the breast, which M. Lebert describes as still prevalent in France, notwithstanding his own clear description of the points of diagnosis.

‡ Physiologie Pathologique, t. ii. p. 201.

§ On the Diseases of the Breast, p. 124.

‖ In the Catalogues of the Museums of the College and of St. Bartholomew's Hospital these tumours are classed with the fibro-cellular. In most of the specimens that I had examined the fibro-cellular tissue was very abundant, and I thought too lightly of the glandular tissue which I found mingled with it.

growths are imperfect hypertrophies, in the same sense as these growths are; nay, these are, in many respects, the very types of the diseases to which the name of tumours is by general consent ascribed, and which can be distinguished, even in verbal definition, from what are more commonly regarded as hypertrophies.

The mammary glandular tumours may be found in any part of the breast; over, or beneath, or within the gland, or at its border. Their most rare seat is beneath the gland; their most common at its upper and inner part, imbedded in, or just beneath, its surface. They are usually loosely connected with the gland, except at their deepest part, where their capsules are generally fastened to it; but the connection is of so small extent that they slide very easily under the finger, and are peculiarly moveable in all directions.

The tumour is commonly of oval shape; superficially, or sometimes deeply, lobed or nodular; firm, or nearly hard, elastic, and often feeling like a cyst tensely filled with fluid. The parts around appear quite healthy. The mammary gland is pushed aside; but it undergoes no other change than that of atrophy, even when stretched over a tumour of the largest size. The skin under distension may grow slightly livid, but else is unchanged. The veins, if the growth of the tumour be rapid, may be dilated over it, as over or near a cancer of the breast. The tumour is usually invested with a complete capsule, isolating it from the surrounding mammary gland, and often adhering less to it than to the gland. This capsule may appear only as a layer of fibro-cellular tissue, like that round any other innocent tumour; but it is not unfrequently more perfectly organised in layers, and smoother on its inner surface; conditions that we may perhaps ascribe to its having been a perfect cyst within which the glandular growth originated, and which the growth has only lately filled.

On section, these tumours present a lobed construction, in which it is sometimes not difficult to discern the remains, or the imitation of the plan, of the lobed, or foliated and involuted intra-cystic growths. In some, the fibro-cellular partitions among the lobes converge towards the centre of the mass, as if they were the remains of clustered cyst-walls; or, there may remain a cavity in the centre of the tumour, as if clustered cysts and growths had not quite filled up the space. In some, however, no such plan is discernible; the whole mass is disorderly lobed, and its lobes have the shapes derived from accidental mutual pressure, and are bounded by loose fibro-cellular partitions.

In structure as in construction, these tumours may present several variations; but they may be artificially arranged in three or four chief groups.

Some are really very like the normal mammary gland in an inactive state. These have a pure opaque-white, and soft, but tough and elastic, tissue; they are lobed, and minutely lobulated, with undulating white fibres. Such an one is well shown in a specimen from Sir Astley Cooper's collection,* in which, moreover, his injection of the blood-vessels shows a moderate vascularity, about equal to that of the surrounding normal gland-substance.

We might take such as this as the examples of the medium form of this kind of tumour; and the other chief or extreme forms are represented by those which deviate from this in two directions. In one direction we find much

* Mus. Coll. Surg., No. 2772. In this specimen there is also a peculiar warty growth in the skin over the tumour.

softer tumours;* these, though closely textured, are soft, brittle, and easily crushed; their cut surfaces shine, or look vitreous or half translucent; they are uniformly greyish-white, or have a slight yellowish or pink hue, which deepens on exposure to the air; or they may look like masses of firm, but flickering jelly; and commonly we can press from them a thin yellowish fluid, like serum or synovia. Such as these have the usual lobed and lobular plan of construction; and I think the intersecting partitions commonly extend from a firm, fibrous-looking central or deep part, towards the circumference of the tumour.

In the other direction from the assumed average or medium form, we find firmer tumours. These have a drier and tougher texture; they are opaque, milk-white, or yellowish, like masses of dense fibro-cellular tissue, lobed, and having their lobes easily separable; as in the great specimen, weighing seven pounds, in the College-Museum (No. 208).

To such as these varieties we might add many, due not merely to intermediate forms, but to the degrees in which the intra-cystic mode of growth is manifested; or to the development of cysts, which may take place as well in this new gland-tissue as in the old; or to the various contents of these cysts, whether liquids or organized growths.†

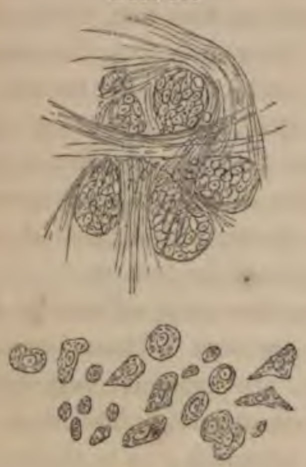
I believe we cannot at present always connect these various aspects of the tumours with any corresponding varieties in their histories. Neither, I think, have any in-

* Such as No. 2774 in the College-Museum.

† I believe these include the chief examples of Müller's Cysto-sarcomata. One of these tumours containing simple cysts would constitute his cysto-sarcoma simplex: the cysts being proliferous with gland growths would make his cysto-sarcoma phyllodes.

vestigations proved more of the corresponding varieties of microscopic structure, than that, as a general rule, the tougher any tumour is, and the slower its growth has been, the more it has of the fibro-cellular, mingled with its glandular, tissue; while the more succulent and vitreous one is, and the more rapid its growth, the less perfectly is the glandular tissue developed.

FIG. 35.*



The microscopic structures may be best described from a medium specimen: from such an one I made these illustrative sketches. The patient was 33 years old; the tumour had been noticed seven months, and was ascribed to a blow; it was painful at times and increasing; and it had the several characters that I have already described. The patient has remained well since its removal.

In such a tumour one finds, in thin sections, traces of a minute lobular or acinous form; the miniature, we might say, of that which we see with the naked eye. The lobules may be merely placed side by side, with little or no inter-

* Fig. 35. Minute structures of a mammary glandular tumour, described in the text: magnified 350 times. The microscopic examinations of several specimens may be found in Lebert (Phys. Pathol. ii. 190; and Abhandlungen, p. 269); Birkett, On Diseases of the Breast, pl. 2, 3, 4, &c.; and Bennett, On Cancerous and Cancroid Growths, p. 52.

vening tissue; their form may appear to depend on the arrangement of their contents, and these may seem scarcely bounded by membrane. But, I think, more commonly, especially in the firmer specimens, the plan of lobules or acini is mapped-out by partitions of filamentous-looking tissue, fasciculi of which, curving and variously combined, appear to arch over, and to bound, each acinus or lobule. But great varieties appear in the quantity of this tissue; it may be nearly absent, or it may so predominate as to obscure the traces of the essential glandular structure.

This proper gland-structure consists of minute nucleated cells and nuclei, clustered in the lobular form, or in that of cylinders or tubes, and often, or perhaps always in their most natural state, invested with a simple, pellucid, limitary membrane.

Thus, the likeness is striking between the structure of such a tumour and that of an inactive mammary gland, such as that of a male, as Mr. Birkett has pointed out. We have here what may be compared with the round or oval cæcal terminations of the gland-tubes clustered together, and often seeming grouped about one trunk-tube; and in these we have the simple membrane and the gland-cells and nuclei within; only, the main duct is wanting, and the communication with the ducts of the proper gland. It is as if the proper secreting structure of a gland were formed without connection with an excretory tube; the tumour is, in this respect, like one of the glands without ducts.

The mammary glandular tumours are singularly variable in all the particulars of their life. They sometimes grow quickly; as did the largest figured by Sir A. Cooper, which, in two years, acquired a weight of a pound and a half. In other cases their growth is very slow; I have known one* which, in four years, had not become so much as an inch in diameter. In some instances they remain quite stationary, even for many years. One† was removed from a woman 27 years old: it was observed for 14 years, and in all that time it scarcely enlarged; yet after this it grew so rapidly, that, in six months, it was thought imprudent to delay the removal. Cases of this arrest or extreme retardation of growth must have been seen by most surgeons; but there are few cases so striking as one related by M. Cruveilhier, in which a lady had, for more than 20 years, three of these tumours in one breast, and one in the other. She died in consequence of the treatment employed against them, and after death no similar disease was found in any other part.

Equal variations exist in regard to pain. Commonly these tumours are painless; but sometimes they are the seats and sources of intense suffering; even of all that suffering which is popularly ascribed to cancer, but which cancer in its early stages so very rarely presents. The irritable tumour of the breast, as Sir A. Cooper named it, was in most of his cases a mammary glandular tumour;‡ and the character of the pain, like that of the painful subcutaneous tumour (p. 125), is such as we may name neuralgic.

A tumour,§ evidently glandular, was taken from the breast of a woman 25 years old, where it had been growing for two years; it had often been the seat of the most intense pain. I referred to a similar case while speaking of

* Museum of St. Bartholomew, Ser. xxxiv. No. 23.

† Mus. Coll. Surg., 207 B.

‡ Under the same name, however, he included some that were more probably "Painful subcutaneous Tubercles:" see his pl. viii. figs. 2, 4, 5, 7.

§ Mus. St. Bartholomew's Hospital, Ser. xxxiv. No. 22.

neuralgic tumours (p. 128), and I removed a similar tumour from the breast of a young lady, who begged for its removal only that she might be relieved from severe suffering. In all these cases the minute glandular structure was well marked.

A peculiarity of these tumours is, that they not unfrequently disappear; an event very rarely paralleled in any other tumour. They are most likely to do this in cases in which any imperfection of the uterine or ovarian functions, in which they may have seemed to have their origin, is repaired by marriage, or pregnancy, or lactation. And the fact is very suggestive: since, in many cases, it appears as if the discontinuous hypertrophy, which constitutes the tumour, were remedied by the supervention of a continuous hypertrophy for the discharge of increased functions of the gland.

On the other side, these tumours often continue to grow indefinitely, and they may thus attain an enormous size. One was removed by Mr. Stanley, which, after twelve years' progress, in a middle-aged woman, measured nearly twelve inches in length, and weighed seven pounds. It was pendulous; and, as she sat, she used to rest it on her knee, till the integuments began to slough. Mr. Stanley merely sliced it off, cutting through the pedicle of skin; and the patient remained well for at least seven years. The tumour was one of the firmest and most filamentous of the kind.*

In the College-Museum is a tumour† of the same kind, but softer and much more succulent, which was removed by Mr. Liston from a woman 44 years old, and which weighed twelve pounds.

* Mus. Coll. Surg., No. 208.
† Mus. Coll. Surg., No. 216.

Respecting the origin of these tumours, little more, I believe, can be said than that, occurring most commonly in young unmarried or barren women, their beginning often seems connected with defective or disordered menstruation. The law which, if we may so speak, binds together in sympathy of nutrition the ovaries and the mammary glands, the law according to which they concur in their development and action, is not broken by one with impunity to the other. The imperfect office of the ovary is apt to be associated with erroneous nutrition in the mammary gland.

I have seen only one specimen of a mammary glandular tumour in a male. A portion of it was sent to me by Mr. Sympson, and its characters were well marked. It was removed by Mr. Hadwen, from a countryman, 25 years old, in whom it had been growing irregularly, and occasionally diminishing or disappearing, for about five years. When removed, it formed a circular, flattened, and slightly lobulated tumour, 3½ inches in diameter, and an inch in thickness, invested with a distinct fibro-cellular capsule, which loosely connected it to the adjacent tissues.

There are, I believe, no facts to suggest that the glandular tumours are, as a rule, other than innocent. More than one may grow in a breast at the same or several successive times; but I have not known of more than three either at once or in succession. Neither am I aware of any facts which prove what is commonly believed, that, after a time, these tumours may become cancerous. Such things may happen; and, on the whole, one might expect, that if a woman have a tumour of this kind in her breast, cancer would be more apt to affect it as a morbid piece of gland, than to affect the healthy gland. But, I repeat, I know no facts to support this; and some that I have met with are against it. Thus, in the Museum of St. Bartholomew's, is a portion of breast,* from a woman 32 years old, in which there lie, far apart, a small mammary glandular tumour that had existed four years, and a hard cancer that had existed four months. A second specimen† shows a hard cancer and a proliferous cyst, in the breast of a patient, who died some time after its removal, with recurrence of the cancer. A third case, just like the first, was under Mr. Stanley's care. In these cases, at least, the tumour was not selected as the seat for cancer ; and I believe that they are not counterbalanced by any of an opposite kind.

And yet, while all the characters of innocent tumours are generally, if not always, observed in these, there are facts concerning a seeming connection between mammary glandular tumours and cancer which must not be passed-by here; though they may need to be again stated in the last lectures on cancer.

It has sometimes happened that a glandular tumour has been removed from a breast, and, within a short time, the same breast has become the seat of cancer.‡ I believe that the explanation of such cases as these may be, that a woman, prone to cancer by some constitutional condition, or, especially, by hereditary disposition, had (as any other might) a glandular tumour in her breast; and that the operation for removing this tumour inflicted a local injury, and made the breast apt to be the seat of cancer, of which already (as one may say) the germ existed in the blood. Such events may prove only an accidental connection between the glandular tumours and the cancer; but they are

* Ser. xxxiv. No. 17.

† Mus. St. Bartholomew's Hospital, Ser. xxxiv. No. 16.

‡ See such a case, by Mr. Erichsen, in the Lancet, Feb. 14, 1852; and the history of a series of preparations in the Catalogue of the Museum of St. Bartholomew's, vol. i. p. 446.

enough to suggest great caution in operating on the breasts of those who may be suspected to be, by inheritance, peculiarly liable to cancer.

But, again, cases sometimes occur in which, I think, the mammary glandular tumours supply examples of what I have already suggested as, probably, a general truth: namely, that the children of a cancerous parent, or those in whose family cancer is prone to occur, are apt to have tumours which may be like innocent tumours in their structure, but may resemble cancers in a peculiar rapidity of growth, and a proneness to ulceration and recurrence after removal. A striking instance of this occurred in Mr. Lawrence's practice. He removed the breast of a lady, from one of whose sisters Mr. Aston Key had removed a breast said to be affected with "fungoid" disease, whose mother had died with well marked hard cancer of the breast, and in other members of whose family cases of cancer were believed to have occurred. The breast removed by Mr. Lawrence comprised a huge sloughing and ulcerating mass of yellowish, soft, flickering substance, like the softest of these mammary glandular tumours, or like the very soft pellucid growths which I have described as occurring in some of the proliferous cysts of the breast. The diseased state of the mass (in consequence of escharotics having been recklessly used) was such, that minute examination showed little more than the absence of distinct cancer-structures. During the healing of the wound, and for some months after it, fresh growths repeatedly appeared. Some of these which I examined were yellow, pellucid, soft, viscid, almost like lumps of mucus, or of half-melted gelatine, imbedded in the tissues of the integuments or scar. With the microscope I found only granules and granule-masses, with elongated nuclei, themselves also granular, set in abundant pellucid substance. I found no sign of cancer-structure or of gland-structure. The substance resembled that which I have mentioned (p. 72) as found in some of the imperfect proliferous mammary cysts.

Now, after repeated removals of such growths as these, the wounds completely healed, and the patient has remained well, and in good general health, for eighteen months.

At nearly the same time, a third sister of this family was under Mr. Lawrence's care; and he removed one of her breasts in which was a great mass, which had grown quickly, and was chiefly composed of well-marked glandular tissue, either in separate solid growths, or inclosed in proliferous cysts. But some parts also of this tumour were soft, pellucid, and gelatinous; and others were as soft, but opaque and dimly yellow. In the firmer parts, the glandular texture was as distinct with the microscope as with the naked eye: in the softer parts no such structures were seen, but abundant free cells and nuclei, of most various and apparently disorderly shapes; some elongated, like small shrivelled fibro-cells; some flattened, like small epithelial cells. I would not venture on an opinion of what these were or indicated: I think they were not cancerous, and the disease has not returned. The main fact of all the cases is, that three daughters of a cancerous mother had mammary tumours; in two, at least, of them the structure was probably not cancerous; and yet the rapid growth, the recurrences in one of them, and the defective or disordered modes of growth in both, were such as marked a wide deviation from the common rules of mammary glandular or any other innocent tumours, and a deviation in the direction towards cancer.

Labial glandular tumours may be briefly described, for their general characters correspond closely with those of the foregoing kind; or, they may appear intermediate in character between the foregoing and those tumours which I described as lying over or near the parotid gland, and as consisting of mixed glandular and cartilaginous tissue. Their likeness to these tumours over the parotid was manifest to Mr. Lawrence, who has added to his account of the tumours by the parotid, the only case of labial glandular tumour that I have found on record.*

The most marked case of labial glandular tumour that I have seen was that of a healthy-looking man lately under the care of Mr. Lloyd. A tumour had been growing in his upper lip for twelve years. It was not painful, but the protrusion of the lip was inconvenient and ugly, the swelling being an inch in diameter. It was imbedded in the very substance of the lip, both the skin and mucous membrane being tensely stretched over it. Its form was nearly hemispherical, its posterior surface being flattened as it lay close on the gums and teeth, its anterior convex and smooth. Its whole substance was firm, tense, and elastic.

Fig. 36.†

* Medico-Chirurgical Transactions, vol. xvii. p. 28.

† Fig. 36. A, structure like the cæcal terminations of gland-ducts in an acinus; B, a separate portion of gland-like tube; C, separate gland-cells, and free nuclei; from the labial glandular tumour described in the text. A and B magnified 300 times; C magnified 400 times.

Mr. Lloyd removed the tumour with the mucous membrane over it, leaving the skin entire. The tumour was firm, slightly lobed, yellowish-white, smooth. In general aspect it resembled the mixed tumours over the parotid, but in minute structure it presented as perfect an imitation of lobulated or acinous gland-structure as any mammary glandular tumour. Its tubes and their dilated ends had distinct limitary membrane, and were filled with nuclei and nucleated cells, like those of the labial glands (Fig. 36). I heard some months afterwards that another tumour was growing in the same lip; but the patient was lost sight of. Such a recurrence, even if it really happened, would be no sufficient evidence of malignancy.

I removed a similar tumour from the upper lip of a man about 30 years old. It had been regularly growing for four years without pain, and projected far externally, reaching to the same distance as the end of his nose. This had a texture of glandular kind, but less distinctly marked than that in the former case. Moreover, in the centre of the mass was a portion of bone; a peculiarity which existed also in Mr. Lawrence's case, and which may add to the probability of relationship between these tumours and the mixed glandular and cartilaginous tumours over the parotid.

Lastly, I may again refer to a specimen in the Museum of St. George's Hospital, in which, in one tumour, a cyst and what looks like one of these glandular growths are combined (see p. 73).

Prostatic glandular tumours were briefly referred to in the first lecture (p. 8), as examples of the abnormal growths by which tumours appear to be connected with simple hypertrophies of organs; and I can add little to what was then said of them.

We owe to Rokitansky* the knowledge that the tumours in the prostate gland, which were commonly, and till lately even by himself, regarded as fibrous tumours, are composed of tissues like those of the prostate gland itself. In enlarged prostates they are not unfrequently found. In cutting through the gland, one may see, amidst its generally lobed structure, portions which are invested and isolated by fibro-cellular tissue, and may be enucleated. Such portions have, I believe, been sometimes removed as tumours, or as portions of prostate gland, in operations of lithotomy. They lie imbedded in the enlarged prostate, as, sometimes, mammary glandular tumours lie isolated in a generally enlarged breast. They look like the less fasciculate of the fibrous tumours of the uterus; but, to microscopic examination, they present such an imitation of the proper structure of the prostate itself, that we cannot distinguish the gland-cells or the smooth muscular fibres of the tumour from those of the adjacent portions of the gland. Only their several modes of arrangement may be distinctive.

At present the examinations of these tumours have been too few to furnish a complete history of them: neither can I add any cases or references to those which were adduced in the first lecture.

The THYROID GLANDULAR TUMOURS were similarly referred in the same lecture. Their history is merged in that of bronchoceles, with which they are usually associated, whether imbedded as distinct masses in the enlarged gland,

* Ueber die Cyste, 1849; and, Anatomie des Kropfes.

or lying close by it, but discontinuous. Yet I suspect that similar growths, of substance like thyroid gland, may occur, as tumours, further from the normal mass of the gland.

Mr. Stanley removed a tumour from the neck of a woman 62 years old. It had been observed for 50 years; for the first 30 of which it was like a little loose "kernel" under the skin, and scarcely increased. In the next ten years it grew more quickly, and in the next ten more quickly still; and now, the skin over it ulcerated, and it protruded and occasionally bled, but was never painful. It looked like an ulcerated sebaceous cyst, seated upon the subcutaneous tissue at the lower part of the neck, just in front of the trapezius. No cause could be assigned for it.

On section it appeared as a solid tumour with a thin fibro-cellular capsule, partitions entering from which divided it into distinct round lobes. Its proper substance was soft, elastic, glistening, yellowish, blotched and streaked with brownish pink and blood colours. It was, to the naked eye, like a piece of bronchocele, with such an arrangement of its parts as would exist when numerous cysts are filled with the glandular growth, and compacted. And the general impression hence derived was confirmed by microscopic examination, which showed that the tumour consisted, chiefly, of round and oval bodies, or minute sacculi, from $\frac{1}{100}$ to $\frac{1}{500}$ of an inch in diameter, filled or lined with nucleated substance, or with nuclei imbedded in a dimly molecular blastema, and not nucleolated. These bodies were closely apposed, but frequently appeared separated by thin filaments, or fibro-cellular partitions. The nuclei were very uniform, circular, about $\frac{1}{4000}$ of an inch in diameter, and in general aspect like the nuclei of vascular glands or lymph-glands. Numerous similar nuclei appeared free; and some appeared imbedded in a dimly molecular blastema which was not enclosed in cysts or sacculi, nor divided by fibro-cellular partitions.

I have seen no other tumour like this; nor any natural texture that it resembled, except the thyroid gland. Future observations must prove whether thyroid glandular tumours can be formed so far from the normal gland, with the cervical fascia, great blood-vessels of the neck, and other adjacent parts, intervening between them.

LECTURE IX.

PART II.

ERECTILE OR VASCULAR TUMOURS.

The erectile or vascular tumours include most of the diseases which are described as vascular nævi, and of which the types are the subcutaneous nævi. Among them, also, are the growths to which John Bell gave the name of aneurism by anastomosis, and those which have been called Telangeiectasis.

The name "erectile tumour" has, of late years, come into general use, as expressing a principal fact concerning these diseases, namely, that many of them resemble very closely in their texture that of erectile or cavernous tissue. Mr. Humphry* has, indeed, rightly objected to the use of the term, that these tumours present no imitation of the erectile tissue in the power of filling themselves with blood, as if by some internal force. But, since this occurrence in the true erectile tissue depends as much on the accessory structures of nerves and muscles as on the tissue itself, we may fairly apply the term "erectile" to the tumours; remembering only for this, as for other structures occurring in tumours, that the imitation of the natural tissue is imperfect, or partial. However, if any be scrupulous in the use of these terms, they may call these tumours vascular, or cavernous, or even Telangeiectasis.

* Lectures on Surgery, p. 111.

The likeness which these tumours bear to the erectile tissue, as exemplified in the corpus cavernosum penis, is sometimes, in general appearance, perfect. A well-marked specimen is in the Hunterian collection,* from which the adjoining sketch was made (Fig. 37). It was removed from under the lower jaw, and its cut surface displays a close network or sponge of fine, smooth, shining bands and cords, just like those of the corpus cavernosum penis, only less regular in their arrangement. The opportunities of examining such tumours in the recent state are very rare; and they are usually spoiled by the operations for removing them; but what I have seen, and the descriptions which others have recorded, leave little doubt that this imitation of erectile tissue is a frequent character among them.

Fig. 37.†

John Bell's account‡ of the aneurism by anastomosis, which is by far the most vivid and exact, in relation to the history of the disease, that has yet been published, accords with this statement. Although he had chiefly in view the

* Mus. Coll. Surg. 301 A.

† Fig. 37. Section of an erectile tumour in the College-Museum, described above. It is drawn one-third larger, and rather coarser, than natural.

‡ Principles of Surgery, vol. i. p. 456, e. s.

arterial variety of these tumours, yet of one he says,—"The substance of it was cellular, stringy, and exactly resembling the corpora cavernosa penis . . . the cells were filled with blood from the arteries, which entered the tumour in all directions." Another he compares to a sponge soaked in blood; and the descriptions of other examples, though less explicit, imply the same. The descriptions by Mr. Wardrop* and Mr. Cæsar Hawkins,† and the more minute accounts of structure by Mr. Goodsir,‡ and Mr. Liston,§ and Rokitansky,‖ confirm this view; and neither Mr. Birkett's,¶ nor any other that I have met with, is discordant from it.

The essential structures of the disease are, according to these descriptions, derived from such a growth of blood-vessels, or rather of blood-spaces, that, in imitation of erectile tissue, the whole mass seems formed of cells or spaces, opening widely into one another: and, in extreme cases, no remains exist of the walls of the vessels, except those narrow bands and cords that bound and intersect the cell-like spaces.**

The division, often made, of erectile or vascular tumours

* Med.-Chir. Trans., vol. ix. p. 201, and pl. vi.

† Medical Gazette, vol. xxxvii. p. 1027.

‡ Northern Journ. of Medicine.

§ Med.-Chir. Trans., vol. xxvi. p. 125.

‖ Pathologische Anatomie, i. 276.

¶ Med.-Chir. Trans., vol. xxx. p. 193.

** What tissue may remain between the blood-vessels depends on the seat of the nævus. The elements of the organ or tissue in which it has its seat will remain between its vessels, wasted or altered by compression or defective nutrition. They are seldom present in any distinct form; but a case is well described by C. O. Weber, in which abundant fibrous and fatty tissue occupied the space between the dilated vessels of an erectile tumour in a child's neck (Müller's Archiv, p. 74).

into such as are named, respectively, "arterial," "capillary," and "venous," is convenient, and probably well-founded. The most frequent examples of subcutaneous nævi, and the more frequent superficial nævi, which are like them in structure, though different in position, appear to consist, mainly, of closely arranged minute blood-vessels, of which some are as small and as simple as medium-sized capillaries, while others, of various size, appear as dilated capillaries, or as small arteries and veins densely clustered, but in just proportions to one another. These are such as may be called "capillary;" understanding, only, that they probably affect minute arteries and veins as well as capillaries. But, on the one hand, deviating from these specimens, we find that in some cases the enlargement of arteries far exceeds, in proportion, that of the veins; the swellings pulsate, and are florid and over-warm, and, if injured, throw-out arterial blood. These constitute the "arterial" form of the disease: the "aneurism by anastomosis." And, on the other hand, are tumours formed mainly of dilated, sacculated, and overgrowing veins; to these, arteries of comparatively small size pass, while from them proceed very large veins: and they are subject to changes of size in all the events that affect, not the arterial, but the venous, part of the circulation.

Now, I believe that, in a majority of cases, the arterial and the venous forms of the disease are constituted by a dilatation of large branches, of one or the other kind, being superadded to such a condition of the small vessels and capillaries as exists in the common, or "capillary" erectile tumours. But I have, also, no doubt that, in rarer instances, arterial tumours are formed by arteries alone, convoluted or anastomosing in a heap, whence, as from an arterial "rete mirabile," normal arteries proceed and lead to capillaries. And, on the other hand, there are, doubtless, venous tumours, which are formed of veins alone, and through which, since they are seated altogether beyond capillaries, the blood passes (according to Rokitansky's comparison) as it passes through a portal vein.

Since few accounts of the minute characters of the erectile tumours have been published, I will briefly describe those which I have examined, beginning with an instance of the medium form, in a capillary subcutaneous nævus.*

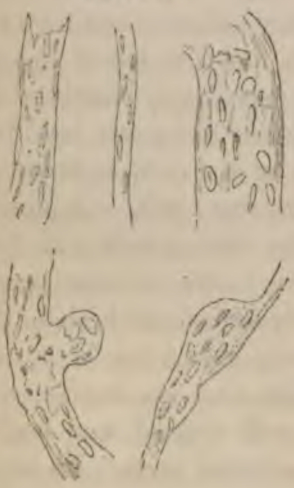
A child, two years old, which had a nævus of this kind on the side of the chest, died exceedingly emaciated after measles and diarrhœa. The tumour had grown from birth-time, and had appeared as one of the most ordinary subcutaneous nævi or erectile tumours; soft, compressible, dimly blue as seen through the skin, swelling in forced expiration, thinly scarred over its centre, in consequence of an ulcer which had spontaneously formed and healed. After death it had shrunk into a very thin layer of brownish tissue between the emaciated skin and the fascia covering the serratus magnus. It was well defined, and could be dissected out cleanly from the adjacent parts. Its surfaces and sections had a distinct lobular arrangement, many lobes projecting from its borders, and those within it being separated by fibro-cellular partitions derived from the tough skin and fascia between which the tumour lay. In its shrunken state, it most resembled, in its obvious characters, a piece of parotid gland; being pale brown in colour, lobulated, soft, but tough, and yielding but little blood on pressure.

About six small collapsed veins proceeded, in a tortuous course, from the surfaces and borders of the tumour. Its

* All the specimens described are in the Museum of St. Bartholomew's Hospital.

arteries were too small to be distinct. Examined with the microscope, the whole mass appeared composed of blood-vessels interlacing in fibro-cellular and elastic tissue, which probably belonged to the natural subcutaneous structure. No parenchymal cells or abnormal forms of tissue were found; the disease seemed to be of the blood-vessels exclusively.

FIG. 38.*



The vessels, which were very difficult to extricate, in any length, from the matted tissue about them, were of all sizes, from $\frac{1}{2000}$ to $\frac{1}{500}$ of an inch in diameter; but I think none were larger. Nearly all of them were cylindriform; a few were unequal, or varicose, or sacculated, with small pouches projecting from their walls (Fig. 38). I could not discern their arrangement; but they did not appear to branch often; neither am I sure that they differed in structure from the normal vessels of subcutaneous tissue, except in that they were, considering their size, of less complex structure: they were as if minute vessels were enlarged without acquiring the perfect form of those which they equalled in calibre. In some parts, I found long cords of fibro-cellular tissue, which, probably, were obliterated blood-vessels.

I have examined other tumours resembling this, but in less favourable conditions. From all, however, as well as

* Blood-vessels of the erectile tumour described in the text. Magnified about 200 times.

from the descriptions of others, I believe the common structure of this form of erectile tumour is a collection of minute blood-vessels, dilated, and closely arranged within a limited area of some natural texture. In the subcutaneous tissue, arteries usually appear to pass into the vascular mass from the under surface of the skin; and veins radiate from it, larger than the arteries and more numerous, but scarcely exceeding the proportion between the normal cutaneous veins and arteries. Within the tumour (which thus, as well by the relation of its vessels as by their minuteness, justifies the epithet "capillary") it is probable that some of the vessels are always sacculated or varicose. Virchow's* account of this state exactly confirms what I have described; and, with more detail, Robin† describes an erectile tumour in which, along the track of the vessels, numerous little culs-de-sac existed, which the blood might be made at will to enter and quit, by alternately pressing and letting-free a piece of the tumour on the field of the microscope. These could be seen on vessels as small as $\frac{1}{5}$ of a millimetre in diameter; they were generally smaller at their connection with the vessels than at their other ends, and were commonly twice as long as the vessels were wide.

But although the vessels within the tumour be thus dilated, yet, as a general rule, in this form of the disease, the dilatation (if there be any) in those proceeding to and from the tumour extends but a short distance from it: the arteries enlarge (if at all) only just before they enter the tumour; the veins regain their calibre soon after they leave it: and hence the general safety with which John Bell and many others have cut out such tumours, when they attended to the rule he lays down with such em-

* Archiv für Pathol Anatomie, B. iii. p. 437.

† In Lebert; Physiologie Pathologique, t. ii. p. 99.

phatic repetition, that in treating such a tumour we are "not to cut into it, but to cut it out." However, this limitation of enlargement to the vessels within and near the tumour, is not so usually observed in the next two forms of the disease, as in this which I have just described.

The best example of the arterial erectile tumour, that I have been able to examine, was from a man who died under the influence of chloroform at St. Bartholomew's Hospital. He was 23 years old, and the disease occupied the external ear, the adjacent subcutaneous tissues, and part of the scalp. The back of the auricle, in nearly the whole extent, was puffed-out by a superficially lobed, soft, easily compressed, and elastic swelling, which all pulsated fully and softly. Two similar and continuous lobes of swelling were under the scalp above and behind the auricle; and these were well defined above, but gradually subsided below. The skin covering the swelling was for the most part dusky-purple, but, except where it was scarred, appeared of healthy texture; the skin of the interior of the auricle and its fibro-cartilage also appeared unaffected, except in the turgescence of the blood-vessels. A posterior branch of the superficial temporal artery passing by the front of the swelling, and a branch of the posterior auricular artery passing behind it, felt large, and pulsated strongly; the common carotid artery, also, on this side, pulsated more fully than that on the other. A distinct soft bruit was audible, synchronous with the pulsation in the tumour; and distinct pulsatile movement was visible.

This disease had been noticed like a very small pimple when the patient was four years old. It had from that time regularly increased. On four occasions severe bleeding had taken place from it, through an ulcer in the skin over it, or through a prominent part over which the skin was extremely thin. After the first of these bleedings a piece of the swelling had been tied, and had sloughed away. A month before the patient's death, Mr. Lloyd had tied and compressed the branch of the temporal artery and two other principal arterial branches at the borders of the swelling; and by this and subsequent treatment had diminished the size of the tumour and the fulness of the pulsation in and around it.

Much of the tumour had been spoiled by this treatment, but enough remained to show that a great part of its substance was like that last described, and probably, like it, consisted of minute blood-vessels collected in a soft spongy mass. But, while the veins proceeding from the swelling were of no considerable size, the arteries passing to it and within it were very large, convoluted, and thin-walled. This was especially observed in the posterior auricular artery, which had not been interfered with in the operations. A lobe of the swelling (as it seemed) had pulsated strongly below and behind the lobule of the ear; and it was for the operation of tying this that the chloroform was given to the patient. This proved to be only a part of the posterior auricular artery, which, from a short distance beyond its origin, was large, and more collapsed and flattened than the other branches of the external carotid. At the beginning of its enlarged part, this artery was from a line to a line and a half in diameter; and from this point its trunk, as well as its branches (which were not unnatural in either number or anastomosis), were tortuous and coiled-up in heaps, which had felt during life like pulsating masses. The dilatation of the arteries was uniform, not sacculated, though in parts the suddenness of the curves made it appear so. The small intervals between them were filled either with the natural fibro-cellular tissue, or with the minute blood-vessels that composed the chief mass of the tumour.

I believe that this specimen presented a fair example of the ordinary structure of the arterial form of vascular or erectile tumours; and that they consist, essentially, of the minute vessels of a limited portion of tissue enlarged and closely clustered, so as to form a tumour, in the substance, as well as about the borders, of which are arteries much more enlarged, and convoluted into pulsating heaps.

The existence, and even the preponderance, of the minute vessels in such tumours was manifest in a specimen sent to me by Dr. Ormerod. A healthy woman, about 60 years old, had for many years a pendulous growth in the lower and inner part of the left axilla. Lately it had grown quickly to the size of the closed hand. It was dark, hard, and knotty, with a distinct pulsation, and hung on a pedicle in which a large artery could be felt. A ligature was tied on the pedicle, and a few hours after another was applied, and the pedicle was cut through.

The tumour was gorged with blood, ecchymosed, and too much damaged for complete examination. Its general aspect was like that of the pedicled outgrowths of skin; but nearly its whole mass consisted of minute blood-vessels confusedly arranged and of various sizes. Their walls showed nuclei, which were generally shorter than those of healthy arteries; but in many instances were placed, as in them, regularly in layers, the external lying longitudinally, others within these transversely, and, still within these, others that were obliquely or variously placed. Besides the blood-vessels, I could find in the tumour only a comparatively small quantity of fibro-cellular tissue; and Dr. Ormerod's examinations, made when the tumour was more recent, had similar results.

Some, I think, have described the arterial tumours as formed by the convolutions of a single artery; and the characters of the swelling formed by the trunk and commencing branches of the posterior auricular artery, in the first of these cases, make me ready to believe that this description may be sometimes true. But I think that, more commonly, many branches of arteries are engaged in the tumour. Such was the case in the tumour of the ear, and in an instance recorded by Mr. Coote.* Arteries of the lip, which, in their natural state, might not have had a greater diameter than a large pin, were dilated for about an inch of their course into sinuses or canals, and were equal in diameter to the adult radial artery. Similar to this was a very formidable case, cured by compression, under the care of Mr. Lloyd. The temporal, supraorbital, and occipital arteries, all exceedingly dilated and tortuous, converged to a large pulsating swelling over the sagittal suture, the general characters of which agreed exactly with what I have described.

In the arterial vascular tumours the veins are comparatively small; and the difficulty of transit for the abundant blood flowing into them, doubtless adds materially to the fulness of the tumours, and of the pulsations seen and felt in them. In the venous tumours the opposite condition obtains; the veins are very large, the arteries comparatively small. Of this kind of tumour the following case presented a good example.

A man, 32 years old, was under the care of Mr. Lawrence. He had a hoof-shaped tumour projecting from the middle of the outer part of his thigh. It was from six to eight inches in diameter, and looked like some strange outgrowth of skin. Its base rested on the fascia

* Medical Gazette, vol. xlv.

lata; it was covered with skin, which was healthy, except in one excoriated place, and adhered closely to it. It was firm, but compressible and elastic, and by long-continued pressure could be reduced to nearly half its size, as if by squeezing blood from it. Several small arteries pulsated at its base; and very large veins, like tortuous sinuses, converged from it towards the upper part of the saphena vein.

The patient was in feeble health, apparently through the effects of a life in India, where, in the Army, he had received a wound by a musket-ball, to which he referred as the cause of the growth of this tumour. Before the wound, he believed the part was quite healthy. The injury appeared superficial, and he was absent from duty only two days; but, six months afterwards, he observed a small tumour, and this, growing constantly and with severe pain, had increased in ten years to the present mass. The skin had been slightly ulcerated for twelve months, and severe hæmorrhages had occurred from the ulcerated part, reducing his already diminished strength.

Mr. Lawrence cut away the whole tumour. Its connections were slight, except to the skin covering it; the arteries at its base bled freely, but for a short time; the great veins bled very little.

A section through the tumour showed that, while some parts of it appeared solid and close-textured, like a mass of firm fibro-cellular tissue; the greater part was like the firmest cavernous or erectile tissue. Sections of blood-vessels, of various sizes and in various directions, were so thick-set, that the surface looked all reticulated and grooved with them. The general colour of the tumour, which seemed to have almost emptied itself of blood during the operation, was nearly white; but in some parts it had a pale ruddy tinge, and in a few was blotched with small rusty and ochry spots.

The microscopic examination was less instructive than the general aspect of the tumour. Its tissue was very hard to dissect, and displayed (as its chief constituent) matted and crooked fibres, like those of close-textured longitudinally striated membrane of blood-vessels, with shrivelled nuclei imbedded in membrane, some of these nuclei being round, some oval, and some very narrow and elongated. I think the obscurity of the microscopic appearances was due to the tenacity with which the blood-vessels were imbedded in the elastic fibrous or nucleated tissue; it seemed impossible to extricate complete vessels; and one obtained by dissection only fragments of their walls confused with the intermediate tissues.

Other cases of venous nævi, which I have been able to examine less completely, have confirmed the foregoing account, especially in regard to the small size of the arteries in comparison with the veins, the generally dilated and varicose state of the latter, and the imitation of the characters of erectile tissue, which appears always more marked in the venous than in the other forms of vascular tumours.

Such are the principal facts that I can cite regarding the structure of the vascular or erectile tumours. They are very meagre, and much is left for future inquirers; especially, the manner in which the larger vessels are connected with those smaller ones which, in most cases, make-up a chief part of the swelling; and the changes of structure, if any, which exist in the proper tissues of the walls of the blood-vessels. Still, from even these few facts some general considerations may be derived.

That which is common to all the vascular or erectile tumours is an over-extension of blood-vessels or blood-spaces within a circumscribed area. Their chief varieties depend (1) on the kind of vessels affected, and (2) on the nature of the tissue in which these vessels lie. The varieties of the first class have been pointed out; but all of them alike present the singular instance of the apparent primary growth of blood-vessels. In all other tumours, as in all abnormal products, the formation of blood-vessels appears to be a consequent and subordinate process. As in the natural development of parts, so in what is morbid, organisation to a certain point precedes vascularity, and the formation of blood-vessels follows-on that of the growths into which they pass. But here the case appears reversed. The calibre of the blood-vessels increases, and the solid tissues between them diminish; all the growth of an erectile tumour is an enlargement of blood-vessels, with diminution of the tissues in which they ramify; or, rather, it is often an enlargement, not of blood-vessels but, of blood-spaces: for though, in the first stages of the disease, the walls of the vessels may grow, and elongate, so that the vessels become tortuous, yet, after a time, the walls waste rather than grow; apertures seem to form through mutually apposed blood-vessels, and at length, while the blood within the tumour increases, the blood-vessels containing it diminish, together with the parts in which they ramified. Hence, at last, in place of branching and anastomosing tubes, there is only a network formed of the remains of their walls. This is an increase of blood-spaces rather than of blood-vessels; so far as solid tissue is concerned, we might call it a wasting, rather than a growth; no new materials seem to be added, but step by step the blood-vessels are dilated, and the intervening tissues clear away, leaving room for more and more blood.

Such a fact constitutes a great contrast between these and any other diseases named tumours. And yet perhaps we may properly regard these as being overgrowths of blood-vessels, comparable with the overgrowths of the various other tissues illustrated in the preceding chapters. And their relation to such overgrowths seems, sometimes, distinctly proved in the gradations of morbid changes that connect them with mere enlargement of blood-vessels. If we examine different specimens of these tumours, or sometimes even the condition of the vessels adjacent to one of them, we may observe a regular gradation from the erectile tumour, through clusters of dilated and tortuous vessels, to that which we regard as merely the varicose condition of the veins or arteries. Such transitions are well shown in some of Cruveilhier's plates, and in a remarkable case by Dr. Hake and Mr. Image;* as well as in two of the cases that I have related.

In relation to the tissues in which this overgrowth of blood-vessels may take place, we may hold that there are two chief classes of cases. In some the vessels of a natural part are affected; in others the vessels of a new growth. In the former class, I think, are the greater part of the common erectile tumours of the skin, and of the other parts in which they are most frequently seated; as the muscles,† the bones,‡ the orbit, and the liver. In these, the remains of natural tissues may be found in the interstices of the blood-vessels, and, either in or near the tumour, well-known arteries or veins are involved. In the

* Medico-Chirurgical Transactions, vol. xxx. p. 109.

† See especially a case by Mr. Liston, Med. Chir. Trans. xxvi. 120; and one by Mr. Coote, l. c.; and Cruveilhier, livr. xxx. pl. 5.

‡ Among these may be included, probably, some of the cases described under the name of Aneurism of Bone and Osteo-Aneurism; as by Dr. Handyside, "Probationary Surgical Essay," Breschet, and others. But I am far from convinced that, in all the cases thus entitled, the blood-vessels of the bone were primarily or chiefly diseased. My impression is that, in many of them, the disease was really medullary cancer of the bone with excessive development of vessels, and that, in some, it was such a blood-cyst as appears to be sometimes formed in the course of a myeloid or cancerous disease.

latter class, examples of which have been cited in the tumours on the side (p. 276) and on the thigh (p. 277), the blood-vessels of new-formed parts are affected. To this class, also, may be referred, I think, the florid and highly vascular growths that are frequent at the orifice of the female urethra,* and perhaps many others.†

As I have hitherto chiefly had in view the subcutaneous erectile tumours or nævi, so I will now, in describing the general characters of the disease, refer to them alone for examples. Even of these, indeed, it is difficult to give a general account, since we can make only an artificial distinction between such as may bear this name, and those extended dilatations of cutaneous vessels which, with little or no swelling, form the cutaneous nævi, port-wine-spots, and the like. These are, evidently, essentially the same disease; the terms, cutaneous and subcutaneous nævi, respectively applied to them, imply only their difference of seat; they have no real difference of nature, and are very often associated. But, if we include only such as are for the most part or wholly subcutaneous, then it may be said that they are generally round or oval, disk-shaped, or spheroidal, but are often ill-defined, the morbid state of the blood-vessels in which they consist gradually merging into the healthy state of those

* The specimens of these growths which I have examined have displayed a very abundant and tesselated epithelium covering a small quantity of fibro-cellular tissue, with close-set and looped blood-vessels. They might be regarded as warts with excessive formation of vessels.

† While this sheet was being printed I received Rokitansky's essay "Ueber die Entwickelung der Krebsgerüste," including his most recent account of the formation of the erectile or cavernous structure of tumours. I shall refer to it in the description of the filamentous tissue or skeleton of medullary cancers in the 11th lecture.

beyond them. Sometimes, and especially in those of most venous character and of longest duration, the mass is circumscribed by fibro-cellular tissue, which forms a kind of capsule, is penetrated by the blood-vessels passing to and from the tumour, and is very intimately connected both with the surrounding parts and with the tumour.

The vascular tumours are remarkable by their frequent beginning before birth, and their especially quick growth in early childhood. Beyond all comparison they are the most common of congenital tumours. Hence, mother-spot is almost synonymous with nævus, and nævus with erectile tumour. But they may begin, or accelerate their growth, at anv period of life. I have seen one of which no trace existed till the patient was twenty-five years old; and another in which rapid growth began, for the first time, when the patient was past fifty. Dr. Warren mentions a case of erectile pulsating tumour about the angles of the eyes and the forehead, which began in a girl seventeen years old. Many others, no doubt, have seen similar cases.

Their origin is generally unknown; but, as one of the cases I have related shows, they may commence in the results of injury; or, rather, a tumour may originate in injury, and in this tumour an exceeding formation of blood-vessels may ensue.

Their growth is uncertain; they may seem at rest for many weeks after birth, and then grow quickly, and then again may stay their growth: and, having attained a certain size, may remain therein limited, or may decrease or disappear, the vessels, in whose enlargement the growth consisted, regaining their natural calibre or becoming obliterated.

Their maintenance of life, if I may so term it, is not strong. They are much more apt than the natural tissues are to slough or ulcerate after injury; and, in general disturbances of the health, they may perish altogether. I know of a case in which a large subcutaneous nævus in a child's forehead sloughed, while another on its back, of much less size, was in process of sloughing after the application of nitric acid. Similar apparently spontaneous sloughings have occurred during, or in the debility following, measles or scarlatina. Such events may be connected with the extreme slowness of the movement of blood in the tumours; for though they contain abundant blood, they probably transmit it very slowly. Venous tumours not unfrequently contain clots of blood and phlebolithes; such, probably, as would form only where the circulation is most slow; and even in the arterial tumours the full pulsation seems to indicate a retarded stream.

The diseases of the vascular tumours are of much interest; especially two amongst them,—namely, the formation of cysts, and that of malignant structures in their substance.

I just referred to the formation of cysts in erectile tumours, when speaking, in the second lecture (p. 38), of serous cysts in the neck, and of sanguineous cysts. The history of the changes by which an erectile tumour becomes in part or wholly cystic is very incomplete; for the opportunities of observing them, except when they are accomplished, are rare. The principal facts are, that, next to the erectile tumours, those that are composed of clusters of serous or sanguineous cysts appear to be the most common congenital form, and that in some cases the two forms appear in one mass. I referred, in the second lecture (p. 39), to such a case as recorded by Mr. Coote. Mr. Cæsar Hawkins,* also, had before described similar cases. He says of one, "you may see, in addition to the

* Medico-Chirurgical Transactions, vol. xxii.; and Medical Gazette, vol. xxxvii. p. 1027.

usual vessels, that several apparent cells exist. Some of these were filled with coagulum; their structure appeared identical with the other veins, of which they constituted, as it were, aneurismal pouches . . . . There were, however, besides these, some other cysts, which contained only serous fluid, and which were, to all appearance, close-shut sacs—serous cysts—their size being about that of peas."

In other instances, no erectile or nævous structure can be found, but the communication existing between one or more among a cluster of cysts and some large blood-vessel, makes it probable that they had the same origin. Thus, Mr. Coote traced a vein, as large as a radial vein, opening into the cavity of a cyst, which formed one of a large cluster removed by Mr. Lawrence from a boy's side. The mass formed by these cysts had existed from birth; some of them contained a serous fluid, others a more bloody fluid. In another similar cluster* removed from a boy's groin, one cyst appeared to communicate with the femoral vein, or with the saphena at its junction with the femoral. In one case mentioned by Mr. Hawkins,† when a cyst in the neck was opened, arterial blood gushed out. In another, the patient died with repeated hæmorrhages from a cyst in the neck, and this cyst was found after death to be one of several, into some of which the blood-vessels of the isthmus of the thyroid gland opened.

It is difficult to interpret the formation of such cysts in nævi, or in connection with them or with veins. It may be that, as Mr. Hawkins believes, cysts are formed in these, as they may be in many other tumours, and that gradually, by the absorption produced by mutual pressure, they are opened into communication with one or more of the veins, or of the sacs connected with the veins. Or, as

* The specimen is in the Museum of St. Bartholomew's Hospital.

† Clinical Lectures in the Medical Gazette, vol. xxviii. p. 838.

Mr. Coote suggests, it may be that certain of the dilatations of the vessels are gradually shut off from the stream of blood, so as to form shut sacs; and that after this their contained blood is absorbed, and replaced by serous fluid.

Lastly, respecting the production of cancerous disease in the tissue of erectile tumours, it seems to be generally regarded as a frequent event, and these are commonly believed to afford the most frequent instances of malignant growths supervening on such as were previously innocent. I will not doubt that such events have happened. In one case recorded by Mr. Phillips,* the transition appears to have been very clearly traced. Yet, I think that in many of the cases which have gained for erectile tumours their ill repute, a clearer examination would have proved that they were, from the beginning, very vascular medullary cancers, or else medullary cancers in which blood-cysts were abundantly formed. Or, it may be that the erectile tumours have been presumed to be liable to cancer, through having been supposed to share in the peculiar liability of the pigmentary nævi, or moles, to be the seats of melanosis.

* On Vascular Tumours, in the Medical Gazette, vol. xii. p. 10.

LECTURE X.

SCIRRHOUS OR HARD CANCER.

PART I.—ANATOMY.

THE foregoing lectures have comprised the histories of the INNOCENT TUMOURS; and in the first of them I related the characters generally appertaining to the MALIGNANT TUMOURS, or CANCERS, which it now remains to describe.

For an account of this class of tumours it will, I hope, suffice if, after reference to the first lecture, I describe, in order, each of the chief forms in which cancers occur, and then gather such conclusions as may be drawn respecting the general pathology of the whole class, and the relations of the several forms to each other, and to other tumours.

The chief forms of cancer are named severally Scirrhous, Medullary, Epithelial, Colloid, Osteoid, Melanotic, Villous, and Hæmatoid. These, at least, are the names most frequently applied to them. The degrees of difference between the diseases to which they are severally applied are not nearly equal; and, probably, under certain of them, two or more diseases are included which are sufficiently different to justify their separation with distinct names. But these are points which, having just mentioned, I may leave to be discussed in the account of each form of cancer, or in the concluding lectures.

First, I will speak of Scirrhous or Hard Cancer.

Being both more frequent and more obvious than any other form of cancer, this was, to the beginning of the present century, the type and chief example of the disease; and so, in regard to its physiology, and many particulars of its structure, it may still remain. It has received many names,* such as scirrhus, scirrhoma, and others, expressing that hardness of texture which is its distinctive and especial characteristic; or such as Carcinoma reticulare, implying certain minute peculiarities of structure. I believe, however, that these peculiarities are too inconstant and accidental to justify the division that they suggest: I will therefore include them all under the name of Scirrhous or Hard Cancer; and will use these terms for all stages of the disease, avoiding that which seems always a confusing distinction, in which, before ulceration, the disease is called Scirrhus, and after it, Cancer.

I will describe the Scirrhous Cancer, first, as it occurs in the breast, because here the disease is far more frequent than in any other part, and presents, openly, most of its varieties of appearance according to its successive stages, and the accidents to which it is exposed.

The scirrhous or hard cancers in the breast are very far from being so uniform that they may be briefly described. I believe that they are always primary cancers; always infiltrations; and almost always seated, in the first instance, in some part of the mammary gland; but, when we compare their other characters in any large number of specimens, we find in them many and great diversities. Probably, therefore, it will be best if I describe first and chiefly the ordinary characters of the disease; the form in which

* Enumerated by Dr. Walshe: On Cancer, p. 10.

it is most frequently seen, when it has not been changed by softening, ulceration, or any other morbid process. I can then add to this description, by way of comparisons, some accounts of the principal deviations from the more usual form; and, in the next part of the lecture, can give the history of the changes that ensue in the progress of hard cancers towards destruction, or in their much rarer regress.

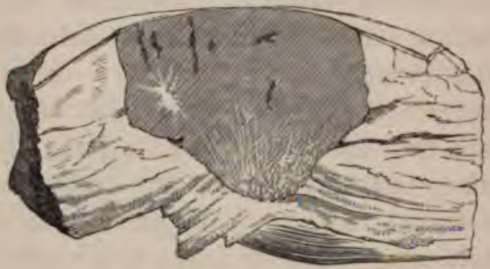
Most frequently, the scirrhous cancer of the breast appears as a hard mass occupying the place of the mammary gland, or of some portion of it. In the cases I have collected it has not been more frequent in one breast than in the other. It is least frequent at or near the inner margin of the mammary gland; but with this reservation, it is not more frequent in one than in another part of the gland, or in any part than in the whole.

While part of the gland is cancerous, the rest is, commonly, healthy; but, according to the age and condition of the patient, it may be more or less atrophied and withered; or excess of fat may be accumulated round it; or it may contain numerous small cysts, or one or more large cysts, most confusing to the diagnosis; or, more rarely, it may be the seat of mammary glandular tumour (p. 258), or of some morbid change of structure. As yet, however, I believe, no connection can be traced between any of these conditions and the growth of cancer, unless it be that it is peculiarly apt to happen in breasts that are being defectively nourished.

The hardness of the cancer, as compared with that of other tumours, is in most cases extreme: it is about equal to that of a lump of fibrous cartilage, and is associated with a corresponding rigidity, weight, and inelasticity. Cases, however, are not unfrequent, especially when the cancer grows quickly, in which the mass is less hard,—very firm rather than hard,—about as flexible and elastic as the body of an unimpregnated uterus.

The size of a hard cancer is seldom very great. In most cases, it is rather smaller than the part of the gland which

Fig. 39.*



it occupies was in the healthy state; so that, *e.g.*, if half a mammary gland become cancerous, and half remain healthy, the latter may be two or three times larger than the former; or, if the whole gland become cancerous, it may be reduced to less than half its natural size. The exceptions to this diminution in the size of the

Fig. 40.†

cancerous gland are, I believe, in cases of very rapid growth, in which the cancer-material seems to be added more rapidly than the materials of the gland can be removed.

* Fig. 39. Section of a hard cancer, extending from a border-lobe of the mammary gland to the superjacent skin, and affecting both these and the intervening tissues. Natural size.

† Fig. 40. Section of a hard cancer of a whole mammary gland. Half the natural size.

The shape of the hard cancer, also, depends chiefly on the part of the gland that it affects. Generally, it may be said that when the cancer does not extend beyond the limits of the gland, it does not much deviate from the shape of the affected part; only, it gathers-up, as it were, the gland-lobes into an irregular lump, in which their outline is not lost, but blunted. Hence, according to their seats, we may observe different shapes of hard cancers of the breast. At the anterior surface of the gland it is usually convex or obliquely shelving; at the posterior surface it is flat or slightly concave, resting on the pectoral muscle; in the middle, or thick substance, of the gland it is commonly rounded and coarsely tuberous, knotted, or branched; at the borders it is often discoid, or else is peculiarly apt to extend from them in a mass reaching to the adjacent skin (fig. 39); and when the whole gland is affected, the cancer has commonly a low conical shape, or is limpet-shaped, with the nipple set on the top of the cone (fig. 40).*

From any such cancerous lump, processes, like crooked, gnarled, and knotted branches, may extend outwards, in correspondence with the out-lying lobes or processes of the gland. But shapes like these are comparatively rare; and scarcely less so are the instances in which portions of the gland, after becoming cancerous, are detached from the chief mass; or those in which, in the same gland, more than one cancer forms at the same time. Such cases do,

* The terms "ramose," "tuberous," and "infiltrated," have been applied to specify the hard cancers, according to their shapes; but at present the shape appears so little connected with any other character of the disease,—it seems so nearly accidental,—that it cannot well be adopted for a ground of specific appellation. Moreover, there is no reason for especially calling the cancers that affect the whole gland, infiltrated; for all the hard cancers of the breast are infiltrations in less or more of its structure.

however, happen; and I have known the smaller detached cancers nearly escape removal in operations.

As we dissect towards the surface of a hard cancer, especially of one of which the growth is not very rapid, we may observe that relation of the tissues around it which is so characteristic; I mean, their contraction towards it, and their progressive absorption. It is as if, in its progress, the cancer were always growing more and more dense, by the contraction and compacting of its substance, and by the absorption of the tissues it involves; and as if, in this concentric contraction, it drew all parts towards itself. To this it is due, that, even from the first, and when it is yet very small, a hard cancer in the breast feels as if it could only be moved with the gland around it; it does not slide or roll under the finger as a mammary glandular tumour does. To this, also, is due the slight dimpling of the skin over the nearest adjacent part of the cancer, even long before the two have become adherent; and to this we must ascribe the more numerous depressions, seaming and wrinkling the surface of the breast, and making it appear lobed, when, in a case of cancer occupying the whole of a large and fat breast, many parts of the skin are drawn inwards. To the continuance of this contraction and absorption, also, are due the sinking-down of the retracted nipple, and the uplifting of the superficial fibres of the great pectoral muscle; and then, the deeper furrowing and the adhesion of the sunken skin or nipple, and the firm conjunction of the pectoral muscle with the deepest portion of the cancer.

Sometimes one finds bands of tough tissue extending from the retracted parts of the skin to the surface of the cancer. These are commonly supposed to be always cancerous,—"claws," or outrunners from the cancer; but the supposition is only sometimes true; they often consist of only the cellular tissue between the lobes of the subcutaneous fat, condensed and hardened.

A scirrhous cancer in the breast has no distinct or separable capsule of cellular tissue investing it: the proper tissues of the breast, that are in contact with its surface, adhere to it very intimately; and the more so, the more slowly it has grown. The general boundary between them is, indeed, distinct to the sight; yet it is not easy to dissect out the cancer; and, at certain parts, it is evident that the tissues around the cancer are continuous with some of those within it. Especially, we can often see that the lactiferous ducts pass, from the nipple, or some healthy portion of the gland, right into the substance of the cancer.

When we cut through an ordinary hard cancer of the breast, such as I am chiefly describing, the surface of the section becomes at once, or in a few minutes, slightly concave. This is a very characteristic appearance, though not a constant one: I know no other tumour that presents it. In all others, I think, the surface of the section either rises, and becomes slightly convex, especially at its borders, or remains exactly level. In well-marked hard cancer the cut surface becomes concave, sinking-in towards its centre, through the persistence, I suppose, of that tendency to contraction, to which, during life, we have to ascribe the traction of the surrounding tissues, and which is now no longer resisted by them.

The cancer seldom appears, on its cut surface, divided into lobes: it is one mass, variously marked perhaps, but not partitioned; neither has it any distinct *grain* or fibrous plan of structure; its toughness and tenacity are complete, and in every direction equal. It has, generally, a pale greyish colour, and is glossy, and half-translucent; often it is slightly tinged with a dim purple hue, or, in acute cases, may be more deeply and more darkly suffused. Very often, too, its greyish basis is marked with brighter whitish lines, like interlacing bundles of short straight fibres, and with minuter ochre-yellow lines, or small yellow spots, and with various transverse and oblique sections of ducts.

The explanation of these various appearances, and of the minuter characters of the cancer, can be understood only by recollecting (what all the foregoing description will have implied), that the cancerous mass is composed not only of structures proper to the cancer, but of more or less of the tissues of the mammary gland, or other parts, among which the cancer-structures are inserted. And the differences implied in the words "more or less," may be considered as explaining many of the differences of appearances that hard cancers present.

The consideration of the influence of cancer-formations on the tissues that they occupy belongs, more properly, to the general pathology of the disease; but I must here just refer to the main facts concerning it.

As I have said, the formation of a scirrhous cancer of the breast consists in the production of peculiar structures—cancer-cells and others- in the interstices of the proper tissue of the part (see fig. 41, p. 297). Virchow* has fairly likened it, so far as the relation of the new and old materials is concerned, to the condition of pneumonia in a lobule of the lung, in which the lymph is deposited among the natural textures, so as to be thoroughly mixed-up with them, and to form one mass with them.

Thus, then, we have, in any such cancer of the breast, a mixture of cancer-substance and breast-substance. But among many cancers we should find many diversities in the proportions of these two substances; which diversities are determined, first, by the original proportions in which

* In his Archiv, B. i. p. 95

the two substances are mingled; and, secondly, by the degrees of wasting, and other changes, that may occur in either or both of them. For example, a large quantity of cancer-substance may occupy so small a portion of the gland, that this portion, spread-out as it is in the substance of the cancer, may be scarcely discernible, and the cancer may look like a completely isolated tumour; or, on the other hand, the whole of an atrophied gland may be condensed within a comparatively small cancer.

Moreover, after the original proportions of the two substances are determined, they may not remain the same; for their subsequent proportions of increase or of decrease may be different. Generally, as the cancer-substance increases, so the involved structures of the breast diminish or become degenerate, till they can hardly be recognised, and the cancer is where the natural structure was: a complete "substitution," as M. Lebert names it, is thus accomplished. But the original tissues do not thus disappear at any given rate, or all in the same rate or order. The gland-lobules, I think, waste very early: I have never found them clearly marked within a hard cancer. The larger gland-ducts remain much longer; their cut orifices may be often seen on the section of the cancer, or they may be traced right into it from the nipple, or fragments of them may be found in microscopic examinations. The small gland-ducts, with their contents, often appear, in branching buff and yellow-ochre lines, imbedded in the substance of the cancer. The fat of the breast is commonly quickly wasted: we find sometimes portions of it encircled by the cancer, and sometimes its yellow tinge is diffused through parts of the cancer, as if they were thoroughly mingled: but both these appearances are limited to the surperficial and more lately formed portions of the growth: they are always lost in the central and older parts. There is the same gradual disappearance of the elements of the skin when it is involved; so that we might say that the regular process in the formation of a cancer of the breast is, that, as the cancer-substance increases, so the natural tissues involved by it degenerate and waste. I repeat, we might say this, if it were not for the fibrous tissue that intervenes among the lobes and ducts of the gland; for this seems either to waste more slowly than any other part, or to remain unchanged, or even in some cases to increase with the progress of the cancer. To these conditions of the fibrous tissue I shall again refer.

Now, if to the progressive varieties that may arise, through these changes in the involved tissues of the breast, we add that parts of the proper cancer-substance may degenerate or waste, or may vary in their method of development, while other parts are merely increasing, we may apprehend, in some measure, the meaning of those great varieties of appearance which we find in any large series of cancers. They are mainly due to the different modes and measures in which the constituents of the cancer-substance and of the original tissues are, first, mingled together, and then increased, degenerated, or absorbed.

After this necessary explanation, let me return to the description of the mingled mass. We find, as I have said, in any ordinary cancer of the breast, a greyish basis, which contains the proper elements of the cancer, but which is or may be intersected by visible fibres, ducts, and yellow lines or spots, which belong chiefly, or entirely, to the textures of the breast. One may usually press or scrape, from the cut surface of such a cancer, a pale greyish, thick, and turbid fluid, which is easily diffused through water, and is much more abundantly yielded when the cancer has been macerated for a day or two in water. It is not creamy, but rather like thick gruel, and is usually composed of a mixture of the proper cancer-substance, and of the softened tissues of the breast, and the contents of the blood-vessels and remaining gland-ducts. It is called the "Cancer-Juice," and what is left after it is expressed, is called the "Stroma" of the cancer (see, further, p. 305). I should state, however, that about the central and deeper parts, or sometimes in the whole masses of the hardest cancers, no such fluid can be obtained; they yield, to pressure or scraping, only a small quantity of yellowish fluid, like turbid serum.

The remaining description of the hard cancer must be, chiefly, from its microscopic appearances.

In very thin sections it is not difficult to see the infiltration, or insertion, of the cancer-substance in the interstices of the affected tissues. It may be most clearly seen in sections of any part of the skin recently invaded by the cancer, for here, in the meshes of the reticulated fibro-cellular and elastic tissues, the cancer-particles are quite distinct, filling every interval, and not obscured by the débris of the gland-ducts and their contents. I am not aware of any more orderly plan of arrangement of the materials of the cancer than that which may be expressed by saying that they fill the interstices of whatever tissue they may lie in. They may either expand these interstices, when they accumulate quickly and abundantly; or, when they shrivel and degenerate, they may allow the tissues to collapse or contract.

FIG. 41.*

* Fig. 41. Cancer-cells filling interstices mong the bundles of the fibro-cellular tissue, in the skin of a breast. Magnified about 200 times.

The elementary structures of the cancer-substance, thus infiltrated in the breast, are chiefly two: namely (1), certain cells and other corpuscles; and (2) a fluid or solid blastema, or nearly homogeneous substance, in which these lie imbedded. We may study these, but, it must be admitted, in some confusion and uncertainty, in the material obtained by the pressure from the cancer.

The blastema, or intercellular substance, presents, I believe, no peculiar features.* As obtained by pressure, it is made very impure by the admixture of blood and other fluids; and it would be unsafe to describe it more minutely than as a pellucid or dimly granular substance, which in certain cases, yet I think rarely, assumes an appearance of

FIG. 42.†

fibrous texture. The corpuscles of hard cancer are chiefly nucleated cells. In ordinary cases, and where the cancer has not been deflected from its normal course, their characters are constant and peculiar, and may be described as for the types of "cancer-cells" (fig. 42).

In shape they are various. Usually a large majority are broadly oval, or nearly round: in some specimens, indeed, all may have these forms; but, in other specimens, though these prevail, yet many cells have one or more angles, or

* Its structures are minutely discussed by Virchow, in his Archiv, B. i. p. 110; and will be again referred to in the lecture on the general structure of cancers.

† Fig. 42. Cells and free nuclei of scirrhous cancer: from breasts. Magnified about 500 times.

out-drawn processes, and some are pyriform, some fusiform, some reniform, some nearly lanceolate.

It would be useless to describe all the shapes that may be found, for we can, at present, neither explain them, nor connect them with any corresponding differences in the general structure or history of the cancers in which they severally occur. But we may observe, as Bruch and others have done, on this multiformity as a feature of malignant structures: I know no innocent tumours, except the cartilaginous, in which it is imitated.

In size, the hard cancer-cells range from $\frac{1}{1600}$ of an inch to $\frac{1}{700}$ of an inch in diameter. Their medium and most frequent sizes are from $\frac{1}{1200}$ to $\frac{1}{1000}$: the smaller dimensions are usually found in the cancers of quickest growth.

In structure and general aspect they most nearly resemble, I think, the secreting gland-cells. Examined immediately after removal, and without addition of water, they appear clear and nearly pellucid; but changes quickly ensue, which water accelerates, and which bring them to the characters more generally ascribed to cancer-cells. They become nebulous, or dimly granular, or dotted, as if containing minute molecules; and they look no longer quite colourless, but very lightly greyish or yellowish. The cell-wall is, if it can be seen at all, peculiarly thin and delicate: but it is often impossible to discern any; and my belief is, that the cancer-cells are often only cell-shaped masses of some soft though tenacious substance, within which are nuclei.

The nuclei in hard cancers are more constant in their appearances than the cells, and, I think, are even more characteristic. They are always comparatively large, having an average long diameter of about $\frac{1}{2500}$ of an inch, and varying from this size much less than the cells do from their's. They are regular, oval, or nearly round, clear, well-defined, scarcely altered by commencing decomposition, or by water, or any moderately diluted test substance. A single nucleus is usually contained in each cell; two nuclei in a cell are frequently found, but not in all specimens of hard cancer; more than two are rare: when more than one are found in a cell, they are generally smaller than those that are single.

Among the materials of a hard cancer, a certain number of free nuclei are usually found. It may be difficult to prove that these have not escaped from cells during the examination: but I think they are naturally free nuclei; for they are often larger than those contained in cells, and they sometimes deviate from the common shape, after methods which are more often noticed among the corpuscles of medullary cancers, and which will be more fully described in the next lecture.

Each nucleus has one, two, or rarely more, nucleoli, which, like itself, are large in comparison with the ordinary proportion between nucleoli and cells, and are peculiarly bright and well-defined.

These seem to be the normal elements of hard cancer; and such as we find them in the breast, such are they, but less mingled and confused with other forms, in the hard cancers of the skin, the bones, and other organs. Indeed, these characters are so nearly constant and so peculiar, that an experienced microscopist can very rarely hesitate in forming upon them a diagnosis of the cancerous nature of any tumour in which they are observed.

But it would seem as if hard cancer seldom long maintained an undisturbed course; for we seldom find these structures, without finding also cells mingled with them, in which degeneration or disease has taken place. Some of them are withered (fig. 43); some contain minute oily particles; some are completely filled with such particles, or are transformed into granule masses (fig. 44); and with these we always find abundant molecular and granular matter, in which, as in the débris of cells, the nuclei lie loose. This débris, too, let me add, is always increased when the cancer is kept for a day or two before examination, and when water acts upon it. The loss of clearness by the cancer-cell, of which I have already spoken (p. 299), is only the first of a series of changes, in the course of which the material of the cells breaks up into molecular and amorphous débris: fragments of it may hang about the nuclei; but, finally, the cells are completely disintegrated, and the nuclei, comparatively unchanged, are set free.

FIG. 43.*

Among the tissues of the breast itself which are involved by the cancer, the gland-lobes, I have already said, are quickly removed; but their debris may contribute to the molecular matter which is mingled with the proper corpuscles of the cancer.

FIG. 44.†

The larger gland-ducts, involved in the cancer, often appear thickened; and their contents, which are usually a thick, turbid, greasy fluid, present abundant granule-masses, withered cells, like epithelial cells of ducts, fragments of membrane, free nuclei shrivelled and deformed, molecular and granular matter: all these being, I suppose, their natural contents, degenerate and disintegrated.

But the more remarkable and characteristic appearances are produced chiefly or in great part by the smaller gland-ducts, and the fibrous tissue inclosed in the cancer. The former

* Fig. 43. Withered hard cancer-cells, with débris.

† Fig. 44. Hard cancer-cells, showing the progress of fatty degeneration.

chiefly constitute that which has been named "the reticulum" of hard cancer, and which has suggested the name of carcinoma reticulare for the specimens in which it is well seen.*

The most usual appearances of what is now described as "reticulum" are two; and these may exist separately, or may coincide. In one, which is the most characteristic, and, indeed, the only one to which the name can apply, we see fine, branching, and variously interlacing and netted lines, of an opaque-white, buff, or ochre-yellow hue. They appear as if formed of thickly sprinkled dots. They traverse the very substance of the cancer; and it is important to observe that when the cancer occupies but a small portion of the mammary gland, these netted lines are found only in that part of it which corresponds with the gland-substance.

In the other and rarer form of what is also called "reticulum," we find larger dots or small masses of ochre-yellow substance, such as are compared to seeds. These lie more widely scattered in the substance of the cancer, and may often be pressed from it, like the comedones, or retained white secretion from obstructed hair-follicles.

I believe that these yellow "seed-like bodies," which are apt, if we examine them superficially, to be confounded with the degenerate contents of the larger ducts, are always small portions of the cancer degenerated, and softened, or partially dried. We find in them abundant

* Under the name of Carcinoma reticulare, Müller included many cancers that could not have been scirrhous or hard cancers. On this ground, I think the name had better not be retained; for, whatever the "reticulum" be formed by, it is too accidental to be considered a specific character, and is associated with too great diversities of other characters, to be used, even arbitrarily, for the determination of a species. It is not even confined to cancers: corresponding appearances may be found in fibro-cellular, cartilaginous, fibro-nucleated, and probably several other tumours (see p. 110, 169, 190).

granule-cells and granule-masses, some entire, some in fragments; fragments, also, of granular and nebulous blastema (as it seems), and often of nucleated membrane; and these lie in molecular and granular matter diffused in liquid, with minute oil drops, and often with crystals of cholestearine. But with these products of complete degeneration, we may commonly find, also, cancer-cells, of which the great majority are either degenerate, filled with fatty matter, like granule-cells, or disintegrated; or else (when the substance is drier) shrivelled and dried up, like the lymph and pus corpuscles that we may find in chronic inflamed lymphatic glands (fig. 43, 44).

Similar to these in their component structures are the larger masses of friable yellow substance, like tuberculous deposits, which are rarely found in hard cancers, but are very frequent in the medullary cancers.

Now, these appearances of yellow spots,—whether seed-like or in larger masses,—are not exclusively found in the breast, or in glandular structures: they may be seen in any hard cancer, and are yet more frequent in soft cancers in all organs. But the fine branching and netted lines that compose the more characteristic reticulum are found, especially, in cancers of glandular organs: and in those of the breast I have so often found, among the products of degeneration in them, what appeared to be portions of withered ducts and epithelium, that I feel nearly sure that the essential characters of this reticulum, in the scirrhous cancers of the breast, are to be ascribed to the minuter lactiferous tubes which, involved in the cancerous infiltration, are now, with their contents, compressed, degenerate, and wasting.*

Lastly, respecting the fibro-cellular and elastic tissues

* We may compare them with a kind of black reticulum seen in cancers of the lungs or bronchial glands.

involved in the cancer, the fate of these, I have said, appears different in different cases. We sometimes meet with a cancer of the breast which, having just involved the skin, shows us the interlacing bundles of cutaneous fibres spread out or expanded by the insertion of the cancer-structures among them (as in fig. 41). The skin in such a case appears thickened, and its section is glossy, grey and succulent, like that of hard cancer, but dimly marked with whitish fibrous bands. In other and more frequent cases the marks are absent; and the fibrous and elastic tissues of the skin are not to be found: we may presume that they have been absorbed as the cancer-structures increased. I think this removal of the fibrous and elastic tissues is the more frequent event, both in the skin and in the gland; yet in some of the hard cancers, and in the central hardest parts of others, the fibrous tissue of the gland—all that which encompasses the gland-tubes and becomes, proportionally, so abundant when the secreting structures waste—all appears to be even increased and condensed or indurated.

Such cancers as these have been regarded as examples of a special form, named Carcinoma fibrosum, and the fibrous tissue found in them has been commonly considered as a proper cancerous structure, a result of the fibrous development of the cancerous blastema. Now, I shall have to refer to certain genuine instances of fibrous hard cancer, as occurring especially in the ovaries; and I would not deny that part of the cancerous material deposited in a breast may be developed into fibrous tissue; but I am sure that, in the large majority of cases, the fibrous tissue which is found in a cancer of the breast is only that which belonged to the breast itself, and which, involved in the cancer, may now be either wasted or increased. For the fibrous tissue in hard cancers of the breast is not like morbid or new tissue, nor like that which is found in really fibrous cancers, but is like the natural fibrous or fibro-cellular tissue, either healthy or indurated and condensed. It is also generally mixed with fibres of elastic tissue, such as are intermingled with the natural fibro-cellular tissue, but never, I think, occur among the proper constituents of cancer, and are very rare in even the more highly organised of the innocent tumours. I may add, in confirmation of this view of the nature and origin of the fibrous tissue in cancers of the breast, that when hard cancer occurs in organs which have little or no fibrous tissue, —such as cancellous bone, the brain, the liver, or the lymphatic glands,—it presents as little or none of the same tissue: however hard it may be, it is formed almost entirely of corpuscles.* The difference in this respect is often, indeed, very striking between the hard cancer of the breast and that of the corresponding axillary glands. Both may be equally hard and manifestly identical in nature; yet, while the cancer of the breast may include abundant fibrous tissue, that in the glands may have scarcely a trace.†

I have dwelt the more on this point because the current method of describing all cancers as composed of a peculiar "stroma," the meshes of which are filled by a peculiar "cancer-

* See, respecting the hard cancer of the brain, a case well described by Dr. Redfern (Monthly Journ. Dec. 1850). I think all that Virchow, Lebert, and some others have written, is quite consistent with this view, though they seem to hesitate in accepting it.

† If it seem strange that in some hard cancers the fibrous tissue of the involved organ increases, while in others it is diminished, the strangeness may be made to seem less by the more glaring examples of difference among cancers of bones;—from the eroding secondary hard cancers, in which the osseous tissue wholly disappears, to the medullary cancers, in which the osseous tissue increases commensurately with the cancer and grows-out into it as a spongy skeleton or frame-work.

juice," appears to me very deceptive, and often incorrect. The expressions, as they are commonly used, imply that the fibrous tissue or stroma, and the cells and other materials which form the juice, are alike proper and essential to the cancer. But I believe that in the large majority of cancers of the breast, the only "stroma," the only substance that would remain, after removing all that is cancerous, would be the structures of the breast itself. And so, in other cancers, my belief is, that if we except the rare examples of the really fibrous, scirrhous, and osteoid cancers, to which I shall hereafter refer, there are few in which more than a very small quantity of fibrous tissue is formed.

In the foregoing description I have had in view, almost exclusively, the forms of hard cancer which are most frequent in the breast; instances of the ordinary or typical characters of the disease. But, as I said at the outset, the deviations from these medium forms are neither few nor inconsiderable, even though we do not count among them any of the varieties of appearance which are due to degeneration, or to disease of the cancerous structure, or to varying conditions in the parts about the mammary gland.

And, first, varieties appear which may be referred to different degrees of activity or intensity of the disease. The examples which I have hitherto chiefly described might hold a middle place in a series, at the opposite ends of which would be those of what have been sometimes called the "acute" and the "chronic" cancers.*

* Most of the acute forms are such as some call *elastic* cancers: most of the chronic would be classed as *fibrous* cancers by those who adopt that term. "Hypertrophic" and "atrophic" have also been applied to them as terms of contrast.

The well-marked examples of the former kind are distinguished, not only by rapid progress, but by structure. They are scarcely to be called hard—they are, at the most, firm, tense, and elastic; and they may even, though not morbidly softened, present a deceptive feeling of fluctuation. Their cut surfaces do not become concave; they are succulent, and yield abundant fluid upon pressure; they are often suffused with vascularity, especially about their borders. The quantity of cancer-structure in them is very large, in proportion to the quantity of gland in which it has its seat. Hence the section of an acute cancer appears more homogeneous, and its growth produces a manifest enlargement or swelling, the morbid material expanding the tissues around and involved within it. The surrounding tissues, also, are less closely connected with the cancer than they usually are, and it may appear like a distinct isolated tumour, rather than an infiltration.

In all these conditions the acute scirrhous cancers aproximate to the characters of medullary cancers; and perhaps the expression is not unjust, that they are examples of an intermediate form of the disease. And the approximation is shown in some other characters, especially in their more rapid growth; in their usually affecting those whose mean age is below that of the subjects of the harder and more chronic cancers; and in the signs of larger supply of blood.

In the chronic hard cancers the opposites of all these characters are found. The cancerous mass is comparatively small; and, as time passes, it often seems to shrink and contract, rather than increase. It is intensely hard, knotted, and dry; the adjacent tissues appear tight-drawn to it, and firmly adherent; and on its cut surface, which usually appears deeply concave, it may show more of the increased and indurated fibrous tissue of the breast than of the proper cancer-substance. All the history of the chronic cancers accords with these signs of inactivity: they occur generally in those that are beyond the mean age; they are attended with no increase of vascularity; and if the skin became involved in one, it is only ruddy or palely livid at the very seat of adhesion. The tissues of the breast itself usually appear to suffer a corresponding atrophy; the gland commonly shrivels, and the skin becomes lax and wrinkled, or else is filled-out with superabundant fat accumulating round the shrinking gland.

Either of these forms of cancer may affect, in some cases, the whole gland; in others, only a portion of it. The characters of both are most marked when they occupy the whole gland, for now the enlargement attending the acute cancer, and the shrinking that accompanies the chronic, are most manifest.

In general, the respective characters of the acute and the chronic cancer are consistent throughout all their course: yet cases are not rare in which a scirrhous cancer has shown all signs of rapid progress at the beginning of its career, but, after a time, has inexplicably retarded its course, and passed into a chronic state. Nor, on the other hand, are those rare in which patients are seen dying quickly, because a cancer, which has been slowly and almost imperceptibly progressive for several years, at length assumes the rapidity and destructiveness of an acute inflammation.

A second series of hard cancers, deviating from the usual forms, consists of cases in which the nipple and the skin or other tissues of the mammary gland are peculiarly affected.

Commonly the hard cancer extends from the mammary gland to the nipple and areola, involving these as it may any other adjacent part. When seated at or near the centre of the gland, it commonly draws down the nipple, which descends as it were into a round pit sunk below the general level of the breast. As it extends, also, the cancer-structures deposited in the nipple make it hard, or very firm and elastic, inflexible, and comparatively immoveable. But the changes which thus usually occur later, or in a less degree, than those in the gland, may commence or predominate in the nipple or the areola. The former may be found quite hard and rigid; or, in the place of the latter, there may be a thin layer of hard cancerous substance, with a superficial ulcer, like an irregular excoriation, while the structures of the gland itself are yet healthy.

In other cases, we find the skin over and about the mammary gland exceedingly affected. In a wide and constantly, though slowly, widening area, the integuments become hard, thick, brawny, and almost inflexible. The surface of the skin is generally florid or dusky with congestion of blood; and the orifices of its follicles appear enlarged, as if one saw it magnified,—it looks like coarse leather. The portion thus affected has an irregular outline, beyond which cord-like off-shoots or isolated cancerous tubercles are sometimes seen, like those which are common as secondary formations. The mammary gland itself, in such cases, may be the seat of any ordinary form of hard cancer; but I think that at last it generally suffers atrophy, becoming, whether cancerous or not, more and more thin and dry, while the skin contracts, and is drawn tightly on the bony walls of the chest, and then becomes firmly fixed to them.

I might add to the account of these deviations from the ordinary forms of cancer of the breast, notices of some others; but these may suffice, and if it be remembered that each of these, as well as of the more common forms, is liable to change by the various degenerations and diseases of the cancer, enough will have been said to illustrate the exceeding multiformity in which the disease presents itself in the breast. Something, however, must be added respecting the characters of scirrhous cancers in other parts of the body; and from these I will select chiefly those parts in which it has the greatest surgical interest, or has received the least attention from morbid anatomists.

In the LYMPHATIC GLANDS, the scirrhous or hard cancer appears very frequently as a secondary disease; indeed there are few cases in which cancerous patients reach their average of life without affection of the glands connected with the organ primarily diseased. But, as a primary disease, scirrhous cancer of the lymphatic glands is very rare: the cancer which most commonly appears first in them is the medullary; especially, I think, that of the firmer kind.* A specimen is in the Museum of St. Bartholomew's,† which shows well-marked scirrhous cancer in an inguinal gland. The gland is increased to an inch and a half in length, and, while retaining its natural shape, nearly the whole of its proper texture appears replaced by structures exactly resembling, in hardness and all other properties, the ordinary scirrhous cancer of the breast. It was removed by Mr. Lawrence from a lady, who remained well about three years after the operation, and in whom the disease then

* The Index will, I hope, in some measure correct the disadvantage, which is here evident, of separating the accounts of the different forms of cancer in the same organ. The disadvantage is, I think, more than compensated by the avoidance of confusion in the descriptions of the different forms; and in the Index the reader will find, under the title of each chief organ or tissue (so far as they are here described), the references to all the forms of cancer occurring in it.

† Series xxi. 2.

recurred in another inguinal gland, which was also removed, and presented the same characters. They were equally marked in the progress through destructive ulceration which ensued in a primary scirrhous cancer of the axillary glands, also observed by Mr. Lawrence. I believe I saw a third instance in some inguinal glands, which formed an exceedingly hard swelling in and below the groin; but I had no opportunity for minute examination of them. There was no probability, in any of these cases, that any other part was the seat of cancer before, or at the same time with, the lymphatic glands.

Cases sometimes occur in which the disease in the glands may be so nearly coincident with that in the organ to which they are related, that we may believe the gland-cancer to be primary, though not alone. And sometimes the disease in the glands greatly preponderates over that in the organ, even though its primary seat was in the latter. A woman, 60 years old, was lately in St. Bartholomew's Hospital, in whose right breast there was a hard lump, less than a pea in size, which felt exactly like a hard cancerous tumour imbedded in the gland. This had existed unchanging for twenty years; and in the right axilla a cluster of lymphatic glands had been rapidly enlarging for twelve months, and now formed a great mass so uniformly hard, heavy, and nodular, as I have never seen formed by any glands but those affected with scirrhous cancer. The case is, however, imperfect, for the patient would submit to no operation, and there may remain some doubt as to the nature of the small tumour in the breast.

All these, however, are comparatively rare events. The ordinary course is, that after the scirrhous cancer has existed for a time, (the length of which seems at present quite uncertain,) in the breast or any other organ, the lymphatic glands in and near the route from that organ towards the thoracic duct become the seats of similar disease. I shall speak elsewhere of the probable method of this extension of the cancer to the glands. Its effects are shown in a process which, in all essential characters, imitates that preceding it in the organ primarily diseased. Usually the cancerous material is deposited, and its structures are formed, in the first instance, in separate portions of one or more glands. The separate formations appear as masses of very firm and hard whitish or greyish substance, of rounded shapes, imbedded in the glands, and contrasting strongly, as well in texture as in colour, with their healthy remaining portions. But, as the separate portions in each gland enlarge, they gradually coalesce till the whole natural structure of the gland is overwhelmed and replaced by the cancer. Similarly, the same changes ensuing at once in many glands, they form a large and still increasing cluster, and at length coalesce in one cancerous mass, in which their several outlines can hardly be discerned.

The minute texture of the hard cancer of lymphatic glands differs, I believe, in nothing that is important from that already described in the cancer of the breast. Only, in microscopic examinations, we find the proper structure of the lymphatics, in the place of those of the mammary gland, mingled with the cells and other constituents of the cancer. Neither is there any essential difference in the mode of deposit of the cancerous material; it is, in both alike, an infiltration, though circumscribed.

Occasionally, it is said, (but I have never seen it,) the secondary cancer of the lymphatic glands is soft and medullary, while that of the organ primarily diseased is scirrhous. Very often, before becoming cancerous, the lymphatic glands enlarge without hardening,—through "simple irritation," as the expression is. From this condition they may subside after the removal of the primary cancer, or when corresponding "irritation" in it is relieved. But the condition, whatever it may be, is probably not one of mere slight inflammation; for glands which may have thus subsided, or which have not been visibly affected, may become the sole or primary seats of recurrent cancer, even two or more years after the removal of the primary disease. There seems to be a peculiar state of liability to cancer, long retained in lymphatic glands, sometimes testified by enlargement, but often not discernible except in its results.

Scirrhous Cancer of the SKIN is another of the affections commonly occurring secondarily, yet sometimes appearing as a primary disease. Its occurrence, when the disease extends continuously from the mammary gland, is already described. In a similar manner it may be found extending from lymphatic glands, or any other subcutaneous organ; and I have described (p. 309) how it sometimes precedes and surpasses in extent the scirrhous cancer of the breast. But its most frequent appearance, in connection with cancer of the breast, and that which is imitated when it occurs as a primary disease in other parts of the skin, is in tubercles or rounded hard masses.

Such tubercles are generally grouped irregularly, but in constantly widening areas, about the primary disease in the breast; in other parts, and as primary cancers, they may be single or numerous. They are almost incompressibly hard, tough, circumscribed masses or knots; they are usually of oval, flat, or biconvex form, or, when large, are tuberous or lobed; they are imbedded, as infiltrations of cancer-structures, in the exterior compact layer of the cutis. They are generally equally prominent above, and sunken beneath, the level of the surface of the skin; and this condition is commonly acquired as well by those which commence like little prominent papulæ, as by those which at first appear like knots just subcutaneous. The skin covering them is thin, tense, and shining; it is usually of a deep ruddy pink colour, tending to purple or brownish-red, or it may seem tinged with brown, like a pigment-mark. This change of colour extends a little beyond the border of the cancerous mass, and then quickly fades into the natural hue of the skin. Such cancers are moveable with, but not in, the surrounding skin, and even with it the mobility is very limited when they are large and deep. They may be found of various sizes; in circumscribed masses, ranging from such a size as can just be detected by the touch, to a diameter of two inches; or, when diffused in the skin, occupying it in an expansion of hardly limited extent.

The minute structures, equally with the general characters, of the scirrhous cancers of the skin, are, in everything, conformed with those already described; and the characters of cancer-cells, and their mode of disorderly insertion in the interstices of the natural tissues, are in no parts more distinct.*

In general, I think, the scirrhous cancers of the skin have a chronic course, not painful, nor soon ulcerating; but, as primary diseases, they are too infrequent for a general history of them to be written at present. I have seen only four examples of them independent of previous cancer in other parts. In one of these the seat of disease was

* In the foregoing account I have not had in view that which is commonly called the "cancerous tubercle of the face," and which so often occurs as the precedent of the destructive process constituting the so-called "cancerous" or "cancroid ulcer" of the face in old persons. I have not been able to examine minutely one of these tubercles before ulceration, but all I have seen of the materials forming the base and margins of the ulcers which follow them, and all the characters of their progress, make me believe that no cancerous structure, whether scirrhous, epithelial, or any other, exists in them. I shall revert to this subject in the lecture on Epithelial Cancer.

nearly the whole skin of the front of the left side of the chest of a woman 73 years old; in another, it was in the skin of an old woman's leg; in another, an elderly man's scalp had two long, hard, cancerous masses in it; in a fourth the disease was in the scrotum of a man 53 years old; but I believe the elementary structures of scirrhous cancer were mingled with others resembling those of the more frequent epithelial soot-cancer of the same part.*

In the MUSCLES, scirrhous cancer is commonly associated with its most frequent form in the skin: that, namely, in which it occurs in groups of tubercles about the primary disease of the breast. We may, indeed, draw a close parallel between the secondary cancers in the skin and muscles respectively; for in both parts alike we find, in some cases, discrete cancerous tubercles, in others extensively diffused cancerous deposits; and in the muscles, as in the skin, the latter form occurs especially when the disease extends continuously; the former when it is multiplied contiguously to its primary seat.

I have never seen a primary scirrhous cancer in a muscle; and only once have seen such a cancer forming a distinct isolated tumour in an intermuscular space. It may be doubted, indeed, whether this tumour were the primary disease; yet, because of the exceeding rarity of scirrhous cancers in any other form than that of infiltrations of the textures of parts, it deserves mention. It was taken, after

* This specimen is in the Museum of St. Bartholomew's. Cases of cancer of the skin are related by Lebert, Walshe, and others, in their appropriate chapters; but it is not clear that any of them were primary scirrhous cancers. Those which were not epithelial cancers appear to have been either medullary, of the firmer sort, or (in Lebert's cases) melanotic. All these forms of cancer are more frequent in the skin, as primary diseases, than that which I have described: they will all be considered in the following lectures.

death, from a man 54 years old, in whom it had been observed for a month, and who died, exceedingly emaciated and exhausted, with similar disease in his axillary and bronchial lymphatic glands, his lungs, muscles, occipital bone, and other parts. This tumour was about four inches in length, oval, surrounded by a distinct fibro-cellular capsule, and seated between the brachialis anticus and biceps muscles, outspreading both of them. It had the same hardness, weight, and density, and the same microscopic cell-structures, as the ordinary hard cancers of the breast; it was milk-white, slightly suffused with pink and grey, and distantly spotted and streaked with ochre-tints. The other cancerous masses had for the most part the same characters; but some, which by their size and positions might certainly be considered as of latest production, were soft, and like the most frequent medullary cancers.

In the BONES, as in the muscles, the scirrhous cancer seldom, if ever, occurs except as a secondary disease: the primary cancers of bones are, I think, always either medullary, osteoid, or colloid. The structures of the scirrhous cancer may be infiltrated or diffused among those of the bone, or they may form distinct masses; but in neither case do they so increase as to form considerable tumours. In some of the cases of infiltration, the cancerous substance is diffused through the cancellous tissue of the bone, while its walls are comparatively little changed: in others all the bony structures are expanded into an irregular frame-work of plates and bands, the interstices of which are filled with cancerous substance, hard, elastic, grey, and shining* On the other hand, when separable cancerous masses are formed, they are usually

* Nos. 822-3 in the College-Museum are examples of the first form;

Fig. 45*

round or oval, or adapted to the shape of the inner walls of the bone, within which they are, at least for a time, confined. They generally appear as if, while they were growing, the original bony textures around them had gradually wasted or been absorbed, making way for their further growth.† And thus the growth of the hard cancer, with absorption (whether previous or consequent) of the bone around it, may continue till not only the medullary tissue, but the whole thickness of the wall, is removed, and the cancer may project through and expand beyond it, or may alone fill the periosteum, retaining, with very little change, the original shape and size of the bone.‡

and No. 5 (Appendix) in that of St. Bartholomew's may exemplify the second. The latter specimen was taken from a case in which a cancerous femur was broken eight months before death, and the new bone, with which it was repaired, was infiltrated with cancer as well as the original textures.

* Fig. 45. Section of a humerus with hard cancer, as described above. Mus. of St. Bartholomew's.

† See, respecting the occasional "preparatory rarefaction" of bones, previous to cancerous deposits in them, the excellent observations of Walshe (p. 555) and Virchow (Archiv, I. 126.)

‡ As in Nos. 817-8-9, in the Museum of the College, and in several specimens lately added to that of St. Bartholomew's.

In both these sets of cases the cancer-cells are alike, and they form, without fibrous tissue, a hard, or very firm, elastic, greyish substance, shining, and sometimes translucent, sometimes with an obscure fibrous appearance. The likeness to the common hard cancer of the breast is complete, in both general and microscopic characters; and not less complete the contrast with the usual forms of the medullary cancer, which, as I have said, is the more frequent primary disease of the bones. Intermediate specimens may, indeed, be found; yet, on the whole, the contrast between medullary and scirrhous cancers is as well marked in the bones as in any other part.*

The bones thus cancerous become liable to be broken with very slight forces; and to these conditions a certain number of the so-called spontaneous fractures in cancerous patients may be assigned. But some are due to the wasting and degenerative atrophy which the bones undergo during the progress of cancer, and which seems to proceed to an extreme more often than it does in any other equally emaciating and cachectic disease.

The hard cancer of the Intestinal Canal, exemplified most frequently in the upper part of the rectum, in the sigmoid flexure of the colon, and, sometimes, in a very striking form, in the ileo-cæcal valve, appears, usually, as an infiltration of hard cancer-structures in the submucous tissue. Here it is usually of annular form, and occupies the whole circumference of the intestine, in a length of

* Medullary cancer may appear as a secondary disease in the bones, as well as in other parts, after primary scirrhous cancer in the breast. The cases I have examined would make me think that the scirrhous cancer is, in these events, the more frequent: but M. Lebert (Traité des Maladies cancereuses, p. 714) describes none but soft cancers as occurring in the bones, whether primarily or secondarily.

from half an inch to an inch. The cancer may, at the same time, or in other instances, occur externally to the muscular coat, and in this case is usually not annular, but in separate tubercles, which, until ulceration ensues, project with flattened, and sometimes centrally depressed, round or oval surfaces, into the cavity of the intestine. Very rarely (it is said) it may affect the whole circumference of a large extent of the rectum, and may in the same extent involve many adjacent parts.

It sometimes happens that the hard cancer of the submucous tissue is associated with growths of softer medullary cancer into the cavity of the intestine, or with formations of colloid cancer. The mingling of these forms is certainly more frequent in the digestive canal than in any other part. But that which is most remarkable in the hard cancers of the rectum (as an example of those of other portions of the canal), is derived from the tendency which the cancer has here, as in other parts, to contract and condense, and adhere to the parts around it. To this it is due, that, when an annular cancer of the rectum exists in the submucous tissue, even the exterior of the bowel appears constricted: instead of swelling, the bowel is, even externally, smaller at the cancer than either above or below

Fig. 46.*

* Fig. 46. Hard cancer of the rectum, showing the constriction of the peritoneal and muscular coats around the cancer of the submucous tissue. Mus. of St. Bartholomew's.

it: and the stricture, or narrowing of the canal, which would be trivial if it depended only on the cancerous thickening of the coats, is made extreme by the contraction of the coats around and with the cancer. The same conditions which, in hard cancer of the breast, produce retraction of the nipple and puckering of the skin over the morbid growth, here produce contraction of the muscular and peritoneal tissues around the growth, and a concentric in-drawing of the growth itself.

With similar likeness to the hard cancers of the breast, those in the intestine (in the rectum, for example) give rise to close adhesion of the tissues round them to other adjacent parts. Thus the cancerous part of the rectum may be fixed to the promontory or front surface of the sacrum quite immoveably; or the colon may become united to the urinary bladder, or to some other portion of the intestinal canal.

Many other important facts in the history of this affection are connected with the dilatation and hypertrophy of the intestine above the stricture; the final paralysis of the dilated part, and the phenomena of ileus chiefly due thereto, with displacement of the diseased part by the weight of fæces accumulated above it; the occasional variations of the degree of stricture, according to the afflux of blood swelling the diseased part, or its ulceration or sloughing decreasing it, and so, for a time, condensing the canal; but these I need only enumerate, while I can refer to Rokitansky* for ample accounts of them all.

The large intestine is, probably, next to the mammary gland and the stomach, the organ in which the well-marked scirrhous cancer is most frequently found as a primary disease. It very rarely, indeed, occurs secondarily,

* Pathologische Anatomie, III. 276 and 282.

except when extending to the intestine continuously from some adjacent part; and in this case, as it usually affects, at first, only part of the circumference of the intestine, it may become much more extensive without producing stricture; for the unaffected part of the wall may dilate so as to compensate, for a time, for the contraction of the diseased part. Moreover, when it is a primary disease, the cancer of the intestine is one of the forms in which the disease may exist longest without multiplication, although often, even in its early stages, it is associated with exceeding, and seemingly disproportionate, cachexia.

I have spoken of the occurrence of fibrous tissue in the scirrhous cancers of the breast, and have said (p. 304) that this appears to be no proper element of the cancer, but the natural fibro-cellular and elastic tissues of the part involved in the cancer, and often increased and condensed. If this be always so, and if, as I have also said, little or no fibrous tissue be found in cancers affecting organs which naturally contain none, it will follow that the name *Carcinoma fibrosum* is not well applied to any examples of hard cancer described in the foregoing pages. Yet there are cancers which contain not only abundant but peculiar fibrous tissue; and these may well be called "fibrous cancers," and may be considered as a distinct form or species, unless it should appear that they are always associated, as secondary diseases, with scirrhous cancers of the more ordinary structure: so that we may suppose that the same blastema is, in one organ, developed into fibrous tissue; in others, at the same time, into cancer-cells.

The most remarkable examples of hard cancers with fibrous structures, that I have yet seen, have been in the ovaries of certain patients with common hard cancer of the breast or stomach.* In these cases, the place of the ovary on either or on both sides is occupied by a nodulated mass of uniformly hard, heavy, white, and fibrous tissue. The mass appears to be, generally, of oval form, and may be three or more inches in diameter: its toughness exceeds that of even the firmest fibrous tumours; and its component fibres, though too slender to be measured, are peculiarly hard, compact, closely and irregularly woven: they are not undulating, but, when they can be separated singly or in bundles, they appear dark-edged, short, and irregularly netted. With these I have found only few and imperfect cancer-cells; with more numerous nuclei, elongated and slender. They are not mingled with elastic or other "yellow element" fibres.

It may be not unfairly supposed that the same blastema, which in other organs may be developed into cancer-cells, may become fibrous in organs of so singular capacity for morbid as well as natural development, as are the ovaries. But fibrous cancers are not found in ovaries alone. Peculiar stiff-fibred tissue is sometimes contained, together with less abundant cancer-cells, in the harder cancers connected with periosteum. So I have seen it in the pelvis, and in the unossified parts of osteoid cancers, where neither its relations nor its minute texture were such as to suggest that it was morbidly increased periosteum. However, the occasions that I have had of examining truly fibrous cancers have been too few, to justify any conclusion respecting the propriety of separating them, as a distinct form, from the scirrhous cancers. And I cannot complete my own imperfect observations with the records of other

* Museum of the College, No. 240, 2636; and of St. Bartholomew's, xxxi. 17, and, probably, xxxii. 14.

pathologists; for I think that none have endeavoured sufficiently to discriminate between the two kinds of fibrous tissue that may be found in cancers; namely, that which is developed from cancerous blastema, and that which is derived from the original fibrous tissue of the affected organ, whether in its natural state, or increased, condensed, indurated, or otherwise morbidly changed. Yet the distinction is an essential one: for the former is truly cancer-structure, the latter is only the structure in the interstices of which the cancer has its seat A similar distinction will have to be made, in a future lecture, between the osseous tissue that grows so as to form the frame-work, or interior skeleton, of certain medullary cancers of bone, and that which is the chief constituent of osteoid cancers: the one is a morbid growth of a bone affected with cancer; the other is the proper cancer-structure ossified.

LECTURE X.

SCIRRHOUS OR HARD CANCER.

PART II.—PATHOLOGY.

The former part of this lecture being devoted to an account of the structures of the chief examples of hard or scirrhous cancers, I propose, in this second part, to consider their history, their mode of life, their pathology as contrasted with their anatomy. And here, even more nearly than in the former part, I will limit myself to the histories of those of the breast; for, concerning the primary hard cancers of other parts, we have too few data for any general history.

First, concerning the conditions favourable to the origin of these scirrhous cancers:—

(*a*) They exist, in great preponderance, in women. Probably, of every 100 cases of scirrhous cancer of the breast, 98 occur in women; and, I believe, it is this alone that makes cancer, on the whole, more frequent in women than in men, for in every other organ common to both sexes the greatest frequency is, I think, found in men.

(*b*) The age of most frequent occurrence of scirrhous cancer of the breast is between 45 and 50 years. Nearly all records, I think, agree in this. The disease has been seen before puberty; but it is extremely rare at any age under 25; after this age it increases to between 45 and 50; and then decreases in frequency, but at no later age becomes so infrequent as it is before 20.

The following table, drawn from the records of 158 cases, of which the diagnosis cannot be reasonably questioned, will illustrate the foregoing statement:—*

2	cases were first observed	between	20	and	25	years of age.†
4	"	"	25	"	30	"
9	"	"	30	"	35	"
26	"	"	35	"	40	"
33	"	"	40	"	45	"
40	"	"	45	"	50	"
17	"	"	50	"	55	"
11	"	"	55	"	60	"
9	"	"	60	"	70	"
6	"	"	70	"	80	"
1	"	above	80			"
158						

These numbers may represent the absolute frequencies of the occurrence of hard cancer of the breast at different ages. But it is more important to know the relative fre-

* This and most of the following tables are drawn from a general table of 365 cases of cancers of all kinds. Of the whole number nearly half were observed by myself. Of the remainder, I have derived about 50 from the records of the Cancer-wards in the Middlesex Hospital, for access to which I am much indebted to the surgeons of the hospital: more than 60 were very kindly communicated to me by Mr. Humphry; others I owe to Mr. Lowe and Dr. Paget: nearly all the rest were collected from the works of Wardrop, Langstaff, Baring, Bruch, Bennett, and Sedillot.

† The ages assigned in this table are those at which, in each case, the disease was first observed *by the patient;* and no case is included which was recorded only, or chiefly, because it was an example of the disease occurring at an unusual period of life.

quencies in proportion to the number of women living at each of the successive periods of life. To ascertain this I have added to the cases in the preceding table those tabulated, in a nearly similar manner, by Mr. Birkett* and M. Lebert;† making a total of 354 cases originating between the ages of 20 and 80 years. Then, comparing the number of cases in each decennial period of life, with the number of women alive in the same period in England and Wales, (according to the Population-Returns for 1841), it appears that the comparative frequencies, relatively to the whole number of women, may be stated in the following numbers :—

Ages.	Relative frequency of the origin of hard cancer.
20 to 30	6
30 „ 40	40
40 „ 50	100
50 „ 60	76
60 „ 70	38
70 „ 80	32

In other words, the proportions between these numbers may represent the degrees in which the conditions of women's lives, at the successive decennial periods, are favourable to the first growth of hard cancer in the breast.

One is naturally led to suppose that the great liability to cancer of the breast between 40 and 50 years of age, and, especially, the maximum between 45 and 50, are connected with some of the natural events that are then occurring in the nearly related reproductive organs; such as

* On Diseases of the Breast, p. 218.

† Des Maladies Cancereuses, p. 354. The particulars of both these tables accord very nearly with those given above; but the numbers of cases below 20 and above 80, in Mr. Birkett's table, are very large; probably because he has included cases that were recorded on account of their rarity in respect of the patients' ages.

the cessation of the menstrual discharge, and of the maturation of ova; or else with the wasting and degeneracy of the mammary glands. And yet it is difficult to prove such a connection with any single event of the period.

The event which is generally regarded as most important is the cessation of the menstrual discharge. But I find that among 52 women with scirrhous cancer of the breast, in whose cases this point is noted, 27 were still menstruating for at least a year after their discovery of the cancer; and 16 had ceased to menstruate for a year or more previous to it; so that less than $\frac{1}{6}$ of the whole number afforded examples of the cessation of the catamenia and the discovery of the cancer occurring within the same year.

The following table shows the ages at which menstruation ceased in 400 women,* and the ages at which hard cancer of the breast was first detected by an equal number:—

Ages.	Cessation of menstruation.	First observation of the cancer.
Below 35	9	36
35 to 40	51	62
40 to 45	140	78
45 to 50	159	101
Above 50	41	123
	400	400

All these calculations are sufficient to prove the great influence which the events of life, at and about the time of the cessation of the menstrual process, exercise in the

* From Dr. Guy's tables, in the Medical Times, 1845. The numbers in the third column are obtained by doubling those in a table of 200 cases, collected from those of M. Lebert and Mr. Birkett, as well as from my own.

production of cancer; but they do not prove that the defect of that process has more influence than others of the coincident events. I think we may most safely hold that the aptness of this time of life for the development of hard cancer is chiefly due to the general failure of the process of maintenance by nutrition, which usually has at this time its beginning, and of which the most obvious natural signs are in the diminution of the powers of the reproductive organs. It is in favour of this view, rather than of any especial influence of the reproductive organs, or of change in the mammary gland, that, so far as we can estimate, with so small a number of cases as are yet on record, the ages of increasing frequency of hard cancer in the male breast,* and of primary hard cancer in other organs, coincide with the results of the far more numerous cases in the female breast. This would hardly be so if it were the condition of the female breast itself, or of any nearly related organ, that alone or chiefly determined the greater frequency of the cancer at particular periods of life.

(*c*) To these conditions of sex and age, as favouring the production of scirrhous cancer, we may add an hereditary disposition, and the effects produced by injury or previous disease. The influence of these conditions is not generally, but is often very clearly, manifested. In 88 patients with hard cancer (including four men and four cases of hard cancer of other organs than the breast) 16 were aware of cancer having occurred in other members of their families. In 40 tabulated by M. Lebert only 6 could be deemed hereditary.† Probably, therefore, not more than 1 in 6

* The four men in whom I have seen hard cancer of the breast were respectively 40, 44, 48, and 52 years old at the discovery of the disease.

† The difference in the proportions of M. Lebert's cases and in mine is probably due to my having reckoned as hereditary three

patients with hard cancer can be reckoned as having hereditary tendency thereto. And it does not appear that such a tendency, even where it exists, leads to an unusually early manifestation of the disease; for the mean age of the hereditary cases which I have collected is very nearly the same as that of the others; namely, about 48½ years. The occurrence of hard cancer in many members of a family cannot, then, be deemed frequent; yet, when it is observed, it is often too striking to leave any doubt about the reality of an hereditary tendency to the disease.

(*d*) So, with regard to the effects of injury and previous disease, I find that, among 91 patients, only 16, *i. e.* less than one-sixth, ascribed the hard cancer to injury or any such local cause. The proportion is so small (it is less even than that of the patients with other tumours, who ascribe them to the same cause*), that we might be disposed to deny the influence of injury altogether, if its consequences were not, in a few cases, so manifest and speedy.

(*e*) I pass by some other conditions supposed to be favourable to the occurrence of scirrhous cancers; such as mental distress, particular occupations and temperaments. Concerning all these, the numerical evidence at present gained is insufficient to justify any conclusions. But, respecting one point much discussed, namely, the general health of women at the time when hard cancer is first found in them, I would observe that a remarkable majority present the appearance of good health. I find that in 91 cases in which I have notes on this point no less than 66 patients

cases in which members of the patients' families had had cancers of the lip. These would be excluded as only "cancroid" by M. Lebert; and so excluded, and added to the non-hereditary cases, they make the proportions very nearly equal in both our estimates.

* See p. 19. Of 79 tumours not cancerous 15 were ascribed to injury or previous disease; *i. e.* 1 in nearly 5¼.

presented the general characters of robust, or, at the least, good health; 9 were of uncertain or moderately good health; and only 16 were sickly or feeble. It does not follow that all these were manifestly ill when the cancer began to form; but, granting that it may have been so, it would still appear that scarcely more than one-fourth of the subjects of hard cancer are other than apparently healthy persons. From all this it is evident, that, except in relation to the comparative liabilities of different ages, we have little knowledge of the events that are, in any sense, the predisposing causes of hard cancer. Indeed, so insignificant in their whole sum are those that are already ascertained, that, in a large majority of cases, the patient finds the cancer by some accident. She chances to touch her breast attentively, or she feels some pain in it, or her friends notice that it is smaller or larger than it used to be; and now, already, there is a cancer of, it may be, large size, of whose origin no account whatever can be rendered.

The fact last mentioned may explain why we so rarely have an opportunity of seeing what a hard cancer is like at its very beginning. I have examined only three that were less than half an inch in diameter. All these were removed within two months of their being first observed, and all had the perfect cancerous structure, such as I have described as the type. I believe they illustrated what is generally true—namely, that the cancerous structure has, from the first, its peculiar hardness. The formation of it appears to be attended with gradually increasing induration, only in the cases in which, from the beginning, it affects the whole gland, and those in which it acquires even more than usual hardness, by the gradual predominance of the increased and indurated fibrous tissue.

From the extreme of smallness the cancer grows; but at various rates, in different cases, and even in the same case, at different times. I believe no average rate of increase can be assigned. Cases sometimes occur, especially in lean, withered women, whose mammary glands share in the generally pervading atrophy, in which two, three, or more years pass without any apparent increase in a cancer; and the progress even of ulcerated cancer is, in such patients, sometimes scarcely perceptible, even in the lapse of years. On the other hand, cases are found sometimes of most rapid increase. I saw such an one last summer. A hard cancer grew in five months from the size of the tip of a finger to a mass five inches in diameter. This was in a woman 32 years old, in whom the disease began while she was suckling, and immediately before, even while suckling, she again became pregnant. Extensive and speedy sloughing followed this rapid growth, and she died in seven months from the first observation of the disease.*

We may very probably connect this singularly rapid progress of a hard cancer with the condition of determination of blood to the breast in which it occurred, and to the early age of the patient,—for, as a general rule, though malignant tumours may, in their plan and mode of growth, deviate never so widely from the normal tissues, yet for their rate of increase they are dependent, in a certain measure, upon the supply of blood and the general activity of the nutritive processes. Hence it needs to be always borne in mind, in questions of operation, that among the cancerous they who seem most robust may succumb most quickly; while the aged and the withered commonly live longest and with least discomfort.

The increase of a hard cancer appears to be by gradual

* This was the same case as that related by Mr. Gay, in the Proc. of Pathol. Soc., 1851-2, p. 444.

superaddition of new particles on the surface of the mass already existing, and in the interstices of the tissue immediately bounding it. It is a nice question to determine how far from a mass of cancer already formed, say, in the breast, the parts to be next added to it will be formed. Practice professes to have settled this in the rule that the whole mammary gland should be removed when only a portion of it is manifestly cancerous. But whatever be the facts on which this rule is founded,—and I believe they are enough to justify it,—they may be explained by the advantage resulting from the removal of all the part in which the cancer would be most apt to recur: they do not prove that cancer is already present in the part of the breast that appears healthy. It is, indeed, rare to find more than one cancerous mass in a mammary gland. I do not remember to have seen it more than four times in about 100 cases; and in one of these the second cancer appeared to have been detached, not to have grown separately, from the principal mass. I have looked with microscopic help at the tissues close by a hard cancer, and have found, I think, cancer-cells one or two lines distant from the apparent boundary of the chief mass, as if the disease had already begun where neither the naked eye nor the finger could have discerned it. Beyond this little distance I have not found reason to believe that cancerous matter in any form exists in the parts of a cancerous mammary gland that appear healthy.

After an uncertain time and extent of growth of hard cancer, Ulceration almost constantly follows. This may ensue in various ways; it may be accelerated or retarded by many extraneous circumstances, according to which, also, its characters may vary; but there are two modes of ulceration which are especially frequent, and are almost natural to the course of the cancer.

In one of these the ulceration begins superficially, and extends inwards; in the other the changes leading to ulceration begin in the substance of the cancer, and thence make progress outwards.

The superficial mode of ulceration is commonly observed when the cancerous growth has slowly reached and involved the skin. The best examples are those in which the hard cancer first affects a border-lobe of the gland. From this, as it grows, it extends towards the skin, occupying, as it extends, the subcutaneous fat, and all the intervening tissues (fig. 39). The skin, as the cancer approaches, whether raised or depressed towards it, adheres closely to its more prominent parts or to its whole surface. It becomes now, while cancerous matter infiltrates it, turgid with blood, thin, tense, and glossy, florid or dusky red, or livid or pale ruddy brown: the congestion does not extend far, nor very gradually fade-out, as in an inflamed integument, but is rather abruptly circumscribed, just beyond the adhesion of the skin to the cancer.

In the next stage, the surface, in one or more places, appears raw, as if excoriated; or else, by some sudden stretching, it is cracked; or a thin yellow scab forms over part of it, which, being removed, exposes an excoriated surface, and is soon reproduced. After a time the excoriated or the cracked surface appears as a more certain ulcer; scabs no longer form, but a copious, acrid, thin fluid exudes. The ulcer is apt to extend very widely; and if there have been more than one, they soon coalesce; but they very rarely extend deeply, and their surfaces rarely appear otherwise than pale, hard, dry, and inactive. The growth of the cancer continues, as usual, after the ulceration; and with the growth and the involving of more skin, the ulceration is generally commensurate.

Now the ulcer thus formed has, in itself, no so-called specific characters: examined by itself, it has not the features assigned to the cancerous ulcer; we recognise its nature through that of the mass beneath it. And yet there is much in the occurrence of this form of ulceration that is characteristic. For we may always notice that, though it is effected as if by the destruction of the skin, and is not unlike the ulceration that ensues over a great firm tumour that has stretched the skin to its extreme of tolerance; yet its occurrence is determined, not by the bulk of the cancer and the tension of the skin, but by the adhesion and confusion of the skin with the cancer. As the cancer approaches the skin, so the skin, without any stretching, becomes thinner and thinner; then its residue becomes cancerous; and then, at length, it is excoriated. The cancer, exposed through the superficial ulcer, is not apt to be exuberant: it does not become or throw-out "fungous growths;" it manifests no peculiar tendency to further ulceration. Granulations* of ordinary aspect, or such as are only too pale and hard, may cover it, and it may often scab, or even skin over; or, if it deepen itself, it may be with no assumption of cancerous shape, but like a common chronic ulcer deepening by sloughing or acute inflammation.

Far different from this, though sometimes superadded to it, is the form of ulcer of the breast which begins in the substance of the cancer. I will not now enter upon the discussions about the softening of cancers (as a normal tendency of their structure), or upon those about their interior

* These granulations are formed of cancer-structures; yet, let it be observed, they take the shape and construction of such as are formed in the healing of any common ulcer.

suppuration: I will only state that, in certain cases of hard cancer, we find cavities filled and walled-in with softened and disintegrated cancerous matter. In these, the dull, ochre-yellow, soft material, consists mainly of degenerate cancer-cells and their débris. It may be mingled with an ill-formed pus; and as these mingled materials increase and enlarge the cavity, so, finally, they are discharged by ulceration. Their discharge leaves in the solid mass of cancer a deep excavated ulcer, a cavity like that of a widely open abscess, except in that it is all walled-in with cancerous matter, the remains of the solid mass. Then, as the walls of this cavity ulcerate on their internal surface, and at the margin of the opening into it, so their outer surface is increased by superaddition of the cancerous matter; *i. e.* as one part of the cancer wastes, by ejection of its ulcerating surface, so is another part increased. Hence the ulcer constantly enlarges: but the ulceration does not destroy the cancer; that increases the faster of the two, extending more and more, both widely and deeply, and involving different tissues more and more continually, to the end of life. In all its course it yields a thin, ichorous, and often irritating discharge, that smells strongly, and almost peculiarly.

In all its later course, when not disturbed, this form of cancerous ulcer has certain characteristic features, which are chiefly due to the concurrent processes of ulceration at one surface, and of predominating fresh formation at the other surface, of the cancer. Thus the edge of the ulcer is raised by the exuberant formation of cancer in and beneath the boundary of skin: the exuberance of the growth necessarily everts the margin, which is too rigid to stretch; and the margin thus raised and everted is hard, nodular, and sinuous, because the growth under it, like the primary cancer, is formed after a knotted tuberous plan. The base of the ulcerated cavity is similarly hard and knotted, or covered with hard, coarse, cancerous granulations. Lastly, when we cut through such an ulcer, we divide a thick layer of cancer, infiltrated in the subjacent tissues, before the knife reaches any normal structures.

It would be vain to try to describe all the various and dreadful forms of ulcer that follow the acute inflammations and sloughings of scirrhous cancers, or all the aggravations of the disease by hæmorrhage from the ulcerating surface, or by obstructions of the lymphatics or the veins. As I passed-by the effects of these accidents of the disease, in describing its structure, so, much more, must I now. Only I would state that these are the events which produce, in cancerous patients, the most rapid and the most painful deaths. When inflammation is averted from it, a cancerous ulcer may exist very long, and make slow progress, without extreme pain or disturbance of the health; it may be no worse a disease than the "occult" cancerous growth; and ten or more years may pass with the health scarcely more impaired than at the beginning. Sir B. Brodie* has related two such cases; and I may add to them one which I have lately seen in a cook, who has for eight years had hard cancer of the breast. During five of these years it has been ulcerated, and yet none of those with whom she lives is aware that she is diseased.

Such cases of arrest of cancer are, however, very rare; they are only rare exceptions to the general rule of that progress towards death, the rate of which is far less often retarded than it is accelerated by such accidental inflammations of the cancer as I have already referred to. Still more rare are the exceptions in which an ulcerated cancer heals. Such cases, however, may be met with, especially among the examples of the more superficial ulcer. The ulcers may be

* Lectures on Surgery and Pathology, p. 211.

skinned-over (as any common ulcer usually is), and the cancerous mass beneath it may waste and be condensed, so that the disease may be regarded as obsolete, if not cured.

The conditions under which this healing and regress of the ulcerated cancer may take place are, I believe, as yet quite unknown. In the following case they seemed to be connected with the development of tuberculous disease, as if the patient's diathesis had changed, and the cancer had wasted through want of appropriate materials in the blood.

I removed the breast of a woman 25 years old, including a large mass of well-marked scirrhous cancer of three months duration. She appeared in good general health, and could assign no cause for the disease. The progress of the cancer had been very rapid; it had lately affected the skin near the nipple; and all its characters were those of the acute form. The axillary glands had been enlarged and hard, but had subsided with rest and soothing treatment. Six months after the operation, and after the patient had been for four months apparently well, cancerous disease reappeared in the skin about the scar, and in the axillary glands. In the skin it rapidly increased; numerous tubercles formed, coalesced, and ulcerated; and the ulceration extended till it occupied nearly the whole region of the scar, and often bled profusely. Thus the disease appeared progressive for twelve months after its reappearance; but at the end of this time the ulcer began to heal, and in the next six months a nearly complete cicatrix was formed; only a very small unhealed surface remained, like an excoriation covered with a scab. The disease in the axilla, also, nearly subsided; one hard lump alone remained of what had been a large cluster of hard glands. But even during and after the healing of the cancerous ulcer she lost strength, and became much thinner, and at length, gradually sinking, she died nearly two years after the operation, and six months after the cancer had so nearly healed.

In the examination after death I found, in the situation of the scar of the operation, a low nodular mass of the very hardest and densest cancer, extending through the substance of the scar and the pectoral muscle, and nearly all covered by thin scar-like tissue. In the axilla was one hard cancerous gland, and in the liver were many masses of cancer as dense and hard as that on the chest. In all these parts the cancer-structures appeared to be condensed and contracted to their extreme limit.

The lungs contained no cancer, but were full of groups of grey succulent tubercles and greyish tuberculous infiltration in every part except their apices, where were numerous small irregular tuberculous cavities. The other organs appeared healthy.

The contrast was very striking, in this case, between the appearances of active recent progress in the tuberculous disease, and of the opposite course in the cancerous disease found after death; and I can hardly doubt that, during life, the progress of the one had been at first coincident, and then commensurate, with the regress of the other.

But leaving, for the present, the questions of the relations between cancerous and tuberculous disease, I would observe that this case illustrated the two modes of healing that may occur in cancer; namely, the formation of a scar over the ulcer, and the shrivelling of the cancerous mass. The first appears to be accomplished according to the ordinary method of the healing of ulcers: the second is probably similar to the contraction and induration of deposits of inflammatory lymph. So far as I know, the process of superficial healing has not been minutely examined in relation to the changes ensuing in the elementary structures of the cancer. Only, one sees cuticle forming on the surface of apparently cancerous granulations. In the process of shrivelling the cancerous mass becomes smaller, denser, drier, and harder; it contracts and draws-in more tightly the adjacent parts; it yields no turbid "juice," but a thin serous-looking fluid may be scraped from it in very small quantity. One finds in such fluid, sparingly distributed, cancer-cells and nuclei, with molecular and granular débris-like matter; but (in the breast) the chief mass of the shrivelled cancer seems to consist of the proper tissues of the organs, indurated and condensed. We cannot doubt that, during such a change, cancer-cells and other elemental structures are absorbed; but the changes preparatory thereto are not, I think, satisfactorily explained.*

Such may serve as a general history of the progress of a scirrhous cancer in the breast. Let me add a brief notice of the pain, cachexia, and some other of its accompaniments.

Among the many inconstancies in the life of cancers, none, I think, is more striking than that which relates to the attendant pain. One sees cases, sometimes, that run through their whole career without any pain. In a case of deeply-ulcerated cancer of the breast, the patient, who had also a cluster of cancerous axillary glands, begged that the disease might be removed, but only because it was "such a terrible sight." It had never once given her the least pain. In another case a patient, from whom a cancer involving the whole mammary gland was removed, was quite unaware of any pain or other affection in her breast till, a few weeks before the operation,

* The whole process is minutely discussed by Virchow, in his Archiv, B. i. p. 185, et seq.

some of her friends observed its diminished size. The largest hard cancer of the breast that I have yet removed was equally painless. Another patient, who died with rapidly progressive and ulcerated cancer, had not a pain in its two years duration.

On the other hand, we sometimes meet with cases that quite exemplify the agony which is commonly regarded as the constant accompaniment of hard cancer. In such a case the patient could "wish herself dead," for the sake of freedom from the fierce anguish of her pain,—pain as if a hot dart were thrust swiftly through her breast, or right through her chest,—pain, startling with a sudden pang, and then seeming to vibrate till it fades-out slowly; or, sometimes, more abiding pain, likened to the burning and scalding of hot water or of molten lead. With such resemblances as these do patients strive to describe the agonies, which are indeed beyond description, and of which the peculiar intensity is perhaps best evidenced by the fact, that the sufferers almost always thus liken them to some imaginary pain, and not to anything that they have felt before. The memories of those who have suffered even the pains of child-birth supply no parallel of that which is now endured; the imagination alone can suggest the things with which it may be compared.

Now, although both these classes of cases be exceptions from the general rule concerning the painfulness of cancer of the breast, yet they are interesting, both for their own sakes, and because they illustrate the nature of the pain attending tumours; they show that it is, in great measure, independent of the merely mechanical condition of the parts; that it is due not to pressure on the nerves, or to their tension or displacement, but rather must be considered as a subjective sensation, a neuralgia, due to some unknown morbid state of nerve-force. That this is so is nearly sure from the fact, that if we compare the most painful and the least painful cancers with each other, we may find their structure and relations exactly similar. Any of the forms that I have described may in one case be attended with intense pain, in another may exist without discomfort. They may present no other difference than the immense difference of painfulness.

However, as I have said, both the very painful cancers and those that are always without pain are exceptional cases. The more general rule seems to be (1), that in the early part of its course (for instance, in ordinary cases for the first year or year and a half), the hard cancer of the breast is either not painful at all, or gives only slight and occasional pain, or is only made painful by handling it; (2) that during this time its pain has usually no peculiar character; is not generally lancinating, but more often, and especially after manipulation, is dull and heavy; (3) that after this time the cancer becomes progressively more painful, and the pain acquires more of the darting and lancinating character; (4) that the pain is generally increased when the cancer grows quickly, and more constantly when it is inflamed or ulcerating, or about to slough; (5) that the pain is yet more intense when the cancer is progressively ulcerating, and now adds to its lancinating character, or substitutes for it, the hot burning or scalding sensation.

With the advance of the local disease the signs of general disorder of the health usually increase; and the cancerous "cachexia," which may at first have been absent or obscure, is established. It would be very difficult to describe this state exactly, and much more so to analyse it. The best description of its most frequent characters is, I think, that by Sir Charles Bell* :—"The general condition

* Medico-Chirurgical Transactions, xii. 223.

of the patient is pitiable. Suffering much bodily, and everything most frightful present to the imagination, a continual hectic preys upon her, which is shown in increasing emaciation. The countenance is pale and anxious, with a slight leaden hue; the features have become pinched, the lips and nostrils slightly livid; the pulse is frequent; the pains are severe. In the hard tumours the pain is stinging or sharp; on the exposed surface it is burning and sore. Pains, like those of rheumatism, extend over the body, especially to the back and lower part of the spine; the hips and shoulders are subject to those pains. Successively, the glands of the axilla and those above the clavicle become diseased. Severe pains shoot down the arm of the affected side. It swells to an alarming degree, and lies immoveable.

"At length there is nausea and weakness of digestion: a tickling cough distresses her; severe stitches strike through the side; the pulse becomes rapid and faltering; the surface cadaverous; the breathing anxious; and so she sinks."

This vivid sketch is generally true of, perhaps, a majority of the cases of hard cancer of the breast; but I doubt whether any one of the signs of cachexia here indicated is constantly present. Even emaciation is not so; for many die, exhausted by the suffering and discharge, in whom fat is still abundant, or appears even increased about the cancer itself. This want of constancy adds greatly to the difficulty of analysing the phenomena of the cachexia. We can see little more than that they include two mingled groups of symptoms: of which one may be called "primary," depending on the increasing morbid and peculiarly cancerous condition of the blood, and the other "secondary," depending on the local disease, and the effects produced on the blood by its pain, discharge, hemorrhage, and various accidents. In the confusion of symptoms thus arising analysis seems impossible.

The last concomitant of the scirrhous cancers of the breast, that I need now speak of, is their multiplication; but I will here only enumerate the methods in which this may happen; for its explanation belongs to the general pathology. These, then, are the methods:—

First, and most frequently, the disease extends to the lymphatic vessels and glands; or to their contents; for it seems most probable that, as Mr. Simon has suggested, its progress is along the continuity of the lymph from the breast to the glands.

(2.) Next, I think, in order of frequency, are the multiplications of the cancer in the same region; not, indeed, in the same gland, but in the skin and muscles near it, and then in areas gradually widening round it.

(3.) It is less frequent for the scirrhous cancer to appear secondarily in the similar tissue of the opposite breast. Indeed, its multiplication, if it may be so considered, is less frequent in this direction than in that of some organs of more different texture, especially the bones, the liver, and the lungs. These, among parts distant from its primary seat, are by far the most frequent seats of secondary disease; but with these, or, much more rarely, alone, nearly every tissue has been found affected.*

The structures of many examples of these secondary cancers are already described (p. 310, &c.). It is often said that the cancers which appear as secondary to the scirrhus of the breast are of the medullary kind; an error which

* M. Lebert has given a table of the relative frequencies of secondary cancers in different organs after primary disease in the breast. It is drawn from 23 autopsies. Mr. Birkett has given a similar table of 37 cases examined after death.

I think must have arisen from the belief that the scirrhous cancer is always fibrous. I have already explained that it very rarely is so, and only appears to be so when it grows in parts containing fibrous tissue; and that what has been generally deemed the fibrous structure of the cancer is usually that of the organ in which it is seated. The secondary cancers are, usually, in all points conformed to the primary, and consist, like them, essentially of cells compacted into a hard mass. They may appear fibrous when growing in fibrous organs: but, inasmuch as their more usual seats are in organs that naturally contain little or no fibrous tissue, they are more commonly formed of cell-structures alone. The change from hard to soft cancer is rare; it may, however, take place, especially in the latest growths; and it is the best illustration of the affinity between the two forms of the disease.

To end this history of the scirrhous cancers of the breast, I must speak of their duration. There is a striking contrast between the certain issue, and the uncertain rate, of their progress. Cases are on record in which life has been ended in four months; and others in which it has been prolonged to twenty-five years; but I am not aware of a single clear instance of recovery: of such recovery, I mean, as that the patient should live for more than ten years free from the disease, or with the disease stationary.

The average duration of life, from the patient's first observation of the disease, is a little more than four years. In 66 cases, tabulated without selection, I find it something more than 49 months.*

* I say "something more," because I have reckoned-in the cases of five patients who are still living more than 49 months from the

Among 61 of these	7	died in between	6	and	12	months
	7	,,	12	,,	18	,,
	8	,,	18	,,	24	,,
	10	,,	24	,,	30	,,
	2	,,	30	,,	36	,,
	12	,,	3	,,	4	years
	6	,,	4	,,	6	,,
	3	,,	6	,,	8	,,
	1	,,	8	,,	10	,,
	5	,,	10	,,	20	,,

The cases are too few to allow of many conclusions: but they suffice at least to show that the average duration of life in these cancerous patients would afford a wrong estimate of the probable duration of life in any single case; since the number who live beyond the average is far less than that of those who die within it, and the mean average is raised by the lives of those few who survive long periods.

It seems at present impossible to estimate many of the conditions which determine the duration of life; but none among them seems more weighty than the age at which the disease commences. There are, indeed, many exceptions to the rule, yet, on the whole, the earlier the disease begins the more rapid is its course. Thus, among those who lived not more than 18 months, I find that the average age at which the disease was first observed was 43 years. Among those who lived between 18 and 36 months, it was

first observation of the disease. In the table on the next page six similar cases are reckoned with those from which the general average is derived. Of the patients already dead, the average duration was, for those in this table, 49·36 months; for those in the next table 48·9 months. The difference is far less than I believed it to be when the lecture was delivered: I was deceived at that time by using too small a number of cases, and a table containing some cases that were recorded only because they were examples of rarely long life.

51 years; and among those who lived between 3 and 8 years, the average at the commencement of the disease was 56·7 years.*

In all the cases from which the foregoing deductions were made, the disease ran its course uninterrupted by operative treatment.

In 47 cases, in which the cancer was once or more removed by operation, the average duration of life, after the first observation of the disease, was again something more than 49 months. I believe, therefore, that the removal of the local disease makes no material difference in the *average* duration of life; but if the following table be compared with that on the preceding page, it will seem probable that the course of the more rapid cases is retarded by the operation. Among 41 of those patients who are already dead,

4	died in between	6	and	12	months.
4	„	12	„	18	„
2	„	18	„	24	„
5	„	24	„	30	„
3	„	30	„	36	„
11	„	3	„	4	years.
8	„	4	„	6	„
2	„	6	„	8	„
1	„	8	„	10	„
1	„	10	„	20	„

* The average for those who lived more than 8 years was only 45 years. But this will not materially invalidate the rule as stated above, if, as I suspect, these long lives owe their unusual duration to something interfering with the more normal progress of the disease; and if, as is also probable, the deaths from cancers commencing in those whose average age is near 60 are often prevented or accelerated by the other diseases which destroy so large a proportion of persons living to that age.

It would seem, I repeat, as if the course of cancerous disease, that otherwise would be very rapid, were retarded by the removal of the growth; for, while in some respects the two tables closely correspond, it may yet be noticed that the proportion of those who die within two years is 36 per cent. of those in whom the disease is allowed to run its course, and only 24 per cent. of those from whom the growth is once or more removed. The number of cases from which this is concluded is indeed small; but other facts might lead us to expect the same, especially that in general the most rapidly fatal cases are those in which the local disease has the greatest share in the death.

The constitutional part of the cancerous disease, little, if at all, affected by the removal of the local part, manifests itself by the recurrence of cancerous growths in or near the seat of operation, or in the lymphatics of the breast, or in some more distant part. In 74 cases, comprising 21 collected by M. Lebert, and 53 by myself, the periods of recurrence after the operation were as follows:—

Between	1	and	3	months in	23	cases.
,,	3	,,	6	,,	22	,,
,,	6	,,	9	,,	8	,,
,,	9	,,	12	,,	6	,,
,,	12	,,	24	,,	7	,,
,,	2	,,	3	years in	3	,,
,,	3	,,	4	,,	1	,,
,,	4	,,	6	,,	2	,,
,,	6	,,	8	,,	2	,,

Neither of us has yet met with a case in which recurrence was delayed beyond eight years.

The table confirms the view that the removal of the local has little influence on the constitutional element of the disease; for even if we believe that many of the cases, reported as recurrences between 1 and 3 months, were examples of continuous, rather than of recurrent, local disease, still the small proportion of cases in which recurrence was delayed more than twelve months after the operation might suggest the belief, that after an operation the constitutional disease continues and increases, till it manifests itself in recurrent local disease, in about the same time as it might have appeared in some secondary cancer, if the operation had not been performed.

The recurrent local disease appears generally to be less intense than the primary. This is probable, both from the fact mentioned at page 346, respecting the smaller proportion of rapidly fatal cases in those submitted to operation, and from the fact that when recurrent cancers are removed, the second recurrences sometimes ensue more slowly than the first did. In 12 cases in which recurrent cancers of the breast were removed, I find that the period of second recurrence, *i. e.* the interval between the second operation and the reappearance of the disease, was

Between	1	and	3	months	in	4	cases.
,,	3	,,	6	,,		3	,,
,,	6	,,	12	,,		1	,,
,,	2	,,	3	years	in	2	,,
,,	5	,,	7	,,		2	,,

And, among these late-recurring cases, is one in which the first recurrence was after 24 months, the second after 60; another of first recurrence in 12 months, and second in 84; and another of first recurrence in 2 months, and second in 24.

It is believed by some that the cancer of the breast (and they would say the same of other cancers) is in the first instance a local disease; and that the constitutional disease which is manifested by recurrence after operation, or by multiplicity of cancers, or by cachexia, is the consequence of the slowly acting influence of the local disease. If this opinion were true, we ought to find that the average interval between removal of the disease and its recurrence bears an inverse proportion to the time of duration of the cancer before removal. No such proportion, however exists: nor does it even appear that recurrence is, on the whole, later after early, than after delayed, operations. The following table shows the times of recurrence in 56 cases, in which the removal of the cancer was effected within various periods, from three months to four years, after its first appearance:—

Time of Operation.	Time of Recurrences— Within 6 months.	Between 6 & 12 months.*	More than 12 months.	No. of Cases.
Under 3 months	4	2	2	8
Between 3 and 6 months	5	2	2	9
,, 6 ,, 12 ,,	5	4	5	14
,, 12 ,, 24 ,,	9	1	3	13
,, 24 ,, 48 ,,	7	3	2	12

The following table shows that the duration of life is not greater after early than after late operations: but this is, doubtless, because the most acute cancers are, on the whole, the most early removed:—

Time of operation.	Average duration of life after the operation.	Number of Cases.
Under 3 months	20 months	4
Between 3 and 6 months	12 ,,	6
,, 6 ,, 12 ,,	39 ,,	8
,, 12 ,, 24 ,,	17 ,,	8
,, 24 ,, 48 ,,	21 ,,	5

Lastly, I can find, in the cases I have collected, no confirmation of the received (and possibly true) opinion, that when some of the axillary lymphatic glands are cancerous, and are removed with the cancerous breast, the recurrence of the disease, and its fatal termination, are more speedy, than after operations in which the breast alone is removed, the glands appearing healthy. In 20 cases of removal of the breast alone, the average time of recurrence was eight months, and that of death twenty-four months, after the operation: while in 10 cases of the removal of the breast with some axillary glands, the recurrence ensued, on an average, in thirteen months, and the death in twenty-four months, after the operation.

I find as little clearly recorded evidence for the similarly unfavourable opinion generally entertained of the effects of the removal of cancers adherent to the skin, or already ulcerated. I would be far from holding that these opinions are incorrect; but their truth is not yet proved; and it is not supported by such cases as I have been able to collect. The recurrences and deaths after these "unfavourable" cases are indeed sure and speedy; but I am not yet clear that they are more so than those are which follow the operations that are undertaken in some of what are deemed the most favourable cases.

The foregoing facts, relating to the influence of the removal of cancerous breasts on the progress of the disease, and on the duration of life, may be considered from two points of view—the pathological and the practical. Mere pathology may study these operations as so many experiments for determining the mutual influences of the local and the constitutional elements of the cancerous disease; or, the questions entertained by some respecting their priority; or, the share taken by each in destroying life. I trust that the tables I have given may be of some avail for the settlement of these and other similar questions to which I shall again refer in the concluding lectures. But at present, few of the facts, which mere pathology can gather from inquiries such as these, are sufficiently clear or pronounced to serve for guidance in the practice of surgery, in which we have to deal with single cases, not with many at once, and in which each case presents many questions that cannot yet be solved by general statements.

In deciding for or against the removal of a cancerous breast, in any single case, we may, I think, dismiss all hope that the operation will be a final remedy for the disease. I will not say that such a thing is impossible; but it is so highly improbable, that a hope of its occurring in any single case cannot be reasonably entertained.

The question, then, is, whether the operation will add to the length, or to the happiness, of life. The conclusion from the foregoing tables might be that the length of life would be the same, whether the local disease were removed or not. But such a conclusion cannot be unconditionally adduced for the decision in a single case. The tables do not include cases in which the operation was fatal by its own conseqnences: yet these are not few. In 235 operations for the removal of cancerous and other diseased breasts, I find 23 deaths: and probably this mortality of 10 per cent. is not too high an estimate,—at least, for the results of hospital practice. We have to ask, therefore, whether it is probable that the operation will add to the length or comfort of life, enough to justify the incurring this risk from its own consequences.

I cannot doubt that the answer may be often affirmative.—1. In cases of acute hard cancer the operation may be rightly performed: though speedy recurrence and death may be expected, its performance is justified by the probability (see p. 346) that it will, in some measure, prolong life, and will save the patient from dreadful suffering. 2. On similar grounds, the operation seems proper in all cases in which it is clear that the local disease is destroying life by pain, profuse discharge, or mental anguish, and is not accompanied by evidences of such cachexia as would make the operation extremely hazardous. 3. In all the cases in which it is not probable that the operation will shorten life, a motive for its performance is afforded by the expectation that part of the remainder of the patient's life will be spent with less suffering, and in hope, instead of despair; for when they are no longer sensible of their disease, there are few cancerous patients who will not entertain and enjoy the hope of long immunity, though it be most unreasonable and not encouraged.

On the other side, there are many cases in which the balance is clearly against the operation.—1. In well-marked chronic cancers, especially in old persons, it is so little probable that the operation will add to either the comfort or the length of life, that its risk had better not be incurred. These are, indeed, the cases in which the operation may be longest survived; but they are also those in which, without operation, life is most prolonged and least burdened. 2. In cases in which the cachexia, or evident constitutional disease, is more than proportionate to the local disease, the operation should be refused: it is too likely to be fatal by its own consequences, or possibly by accelerating the progress of cancer in organs more important than the breast. On similar grounds, and yet more certainly, it should not be performed when there is any reasonable suspicion of internal cancer. 3. If there be no weighty motives for its performance, the operation should be avoided in all patients whose general health (independently of the cancerous diathesis) makes its risk unusually great;—in all, for example, who are very feeble, very fat, over-fed, intemperate, or in any of those conditions which make persons unfavourable subjects for surgical operations.

The above rules leave unconsidered a large portion of the cases of hard cancer of the breast; and I fear that, at present, no other statement can be made concerning the cases which do not fall within such rules as these, than that each must be decided, by weighing the probability that the operation will prove fatal, or, by weakening the patient, will accelerate the progress of the constitutional disease, against the probability of its adding to the comfort, and thereby to the length, of life. The first of these probabilities must be estimated by the same general principles (vague as they are) by which we reckon the dangers of all capital operations: the estimate of the second may be, I hope, assisted, though it cannot be settled, by the evidence collected in the foregoing tables. In every case we should keep in view the two-fold method of destruction by this disease. It may destroy life by its consequences as a local disease; or by its primary and specific cachexia, which may be progressive independently of the local affection. Usually, indeed, its local and constitutional parts mutually affect and aggravate each other, and both contribute to the fatal issue: but, since they do not always contribute in the same proportions, our object should be to ascertain, in each case, which will contribute most,—the local disease, which the operation can remedy, or the constitutional, which, if at all affected by the operation, may be made more intense.

LECTURE X.

MEDULLARY CANCER.

PART I.—ANATOMY.

FROM the long list of names which Dr. Walshe, with his usual profound research, has found assigned to this disease, I select that of MEDULLARY CANCER, because it has been sanctioned by the longest usage and by many of the best pathologists. It is true that the term "medullary" is vague and unmeaning; yet even this seeming defect may have some advantage, since, after long custom, we may now employ the word, as we do inflammation, cancer, and many others, without any reference to their original meaning, and, therefore, without any danger of too much limiting our thoughts to the likenesses which they express. The very precision and fixity of such terms as encephaloid, cerebriform, cephaloma, and the like, are objectionable, by directing the mind to a single character of diseased structures, and that an inconstant one; for the likeness to brain is observable in only a portion of the tumours to which the names of brain-like and its synonyms are applied.

The boundaries of the group of medullary cancers can be only vaguely drawn; for, although, on the whole, and as a group, they have peculiarities, both of structure and of history, which sufficiently distinguish them from the scirrhous and other cancers, yet, define them by whatever character we may, a series of specimens might be found filling every grade between them and each of the other chief forms. The term "soft cancer," often applied to them, expresses their most obvious, though not their most important, distinction from the scirrhous or hard cancers, and, used comparatively, it might, for the present, suffice for the definition of the group. But, in the group thus defined, there are included many forms that appear widely different from each other; and there is, as Rokitansky has well said, no disease of which the examples present more deviations from any one cardinal character. It might be right to arrange the examples of some of these deviating forms under distinct titles; but, at present, it may be more useful to make no other division of the group, than into such as may be called, respectively, *soft* and *firm* medullary cancers. In any large series of specimens, the softer kind would constitute about two-thirds, the firmer about one-third, of the whole number. The former would include such as are described as encephaloid, brain-like, milt-like, pulpy, placental, &c.; the latter would be such as have been called mastoid, solanoid, nephroid, apinoid, &c.*

Certain transitional specimens would be found in the series, which might be arranged in either division, or between the two; but these, though they may prove that there is no specific distinction between the two chief divisions, do not invalidate the utility of speaking of them separately.

The medullary cancers, whether soft or firm, may grow

* I believe, also, that many examples of "albuminous sarcoma" have been firm medullary cancers.

either as separable tumours, or as infiltrations. In the former condition, they are most frequent in the intermuscular and other spaces in the limbs, in the testicle, the mammary gland, and the eye: rarely, they are thus found in the bones. In the latter condition, they most frequently occupy the substance of the uterus, the digestive canal, the serous membranes, the periosteum, and the bones.

We have, herein, the first point of contrast, in addition to that of their consistence, between the medullary and the scirrhous cancers. The latter are almost always infiltrations of natural parts: the former appear, in nearly equal frequency, as infiltrations, or as distinct growths, of cancer-substance.

The contrast is equally marked between them in regard to their respective seats and allocations. Of every 100 primary hard cancers, I believe that not less than 95 would be found in the breast; and there is no other organ in which they are not very rare. But, among 103 tabulated instances* of medullary cancer in external parts, the seat of primary disease was in the

Testicle	in	29	cases.
Bones (most frequently in the femur)	,,	21	,,
Limbs (especially in the intermuscular spaces)	,,	19	,,
Eye-ball or orbit	,,	10	,,
Breast	,,	7	,,
Walls of the chest or abdomen .	,,	5	,,
Lymphatics	,,	4	,,
Various other parts	,,	8	,,
		103	

* It need hardly be said that this table, containing no cases of medullary cancer in the uterus or other internal organs, is not in-

Let me now, for general examples, describe such soft medullary tumours as often occur in the intermuscular spaces of the limbs or trunk.

To the touch they present a peculiar softness, or a deceptive sense of the slow fluctuation of some thick liquid; so that, even to the most experienced, their diagnosis from collections of fluid is often doubtful; and the achievement of experience in relation to them is caution rather than knowledge.

In shape, these tumours are commonly round, oval, or spheroidal, fitting the adjacent parts. But they may be variously lobed; and when they are so, these following things may be noticed in them, as well as in the firmer kinds. (1) Their lobes are peculiarly apt to extend into muscular and other interspaces, far away from their chief mass. Thus (as I have seen) in the foot, they may track through the interosseous metatarsal spaces, or between bones of the tarsus; or, about the hip or knee, portions may extend deep down to the immediate coverings of the joint; or, from behind the ankle-joint, they may reach, with the flexor tendons, far into the sole of the foot. (2) Thus deepening as they grow, parts of these tumours may acquire unexpected deep-seated attachments. It is frequent to find them so attached in the neck, even when, in their beginning, they were easily moveable tumours, or such as patients call "kernels." (3) In the same extension, they are much more apt than other tumours are to grow round, and completely enclose, important vessels and

tended to prove anything concerning the relative frequency of the disease in each part of the body. I know no records by which this could be proved. Its only purposes are, to show the contrast between medullary and scirrhous cancers in relation to their usual seats in external parts, and to indicate the kind of cases from which many of the other tables in this lecture are derived.

nerves. I have thus seen, in one case, the phrenic nerve, in another the pneumogastric, in another the femoral artery, in others the carotid artery and jugular vein, passing right through medullary cancers which, at first, appeared freely moveable and not deeply fixed, and even now had no characters of infiltration.

The parts around a separable medullary cancer are generally only extended, as they might be round an innocent tumour. They are usually not contracted, or adherent, as those next to a hard cancer are. Even such a tissue as the glandular substance of the testicle may be cleanly separated from the surface of a medullary cancer, round which it has been stretched. Sometimes, however, the parts near the principal tumour contain smaller detached growths; and more rarely they are infiltrated with cancer.

When a distinct capsule exists round a medullary cancer, it is usually composed of fibro-cellular tissue, forming a very thin layer, from the interior of which partitions may pass, intersecting the substance of the tumour, or investing its several lobes. Generally, such a capsule contains numerous tortuous blood-vessels; and is tensely filled, so that, as soon as it is cut, the tumour protrudes, or, when very soft, oozes-out like a thick turbid fluid. It is, usually, easy to separate the capsule, or part of it, from the surrounding tissues; but it may be closely adherent, and, I think, generally is so in the cases of medullary cancers in the breast.

In section, the soft medullary cancers usually appear lobed; and the partitions between the lobes, derived from the investing capsule, are often so complete that they may appear like separate cysts filled with endogenous growths. The lobes are of various sizes and shapes, through mutual compression; and they may even seem very differently constructed.

The material composing these cancers (when not disordered by the effects of hæmorrhage, inflammation, or other disease) is a peculiar, soft, close-textured substance, having very little toughness, easily crushed and spread-out by compression with the fingers. It is very often truly brain-like, most like fœtal brain, or like adult brain partially decomposed and crushed. Many specimens, however, are much softer than brain; and many, though of nearly the consistence of brain, are unlike it, being grumous, pulpy, shreddy, or spongy, like a placenta, with fine soft filaments. Very few have a distinct appearance of fibrous or other regular structure.

In colour, the material may be white, but most commonly, when the cancer is fresh, it is light grey (like the greyness of the retina after death.) The tint is usually clear; it is in many cases suffused with pale pink or lilac, or with a deeper purple; and, in nearly all, is variegated with effused blood and full blood-vessels, whose unequal abundance in different parts of the tumour produces a disorderly mottled appearance. Masses of bright yellow or ochrey substance also, like tubercle, are often found in or between the lobes, as if compressed by them, while withering and drying in the midst of their growth.

When pressed or scraped, the soft medullary cancers yield abundant "cancer-juice," a milky or cream-like, or some other turbid, material, oozing or welling-up from their pressed mass. There is no better rough test for the diagnosis of medullary cancers than this is; and the substance thus yielded is generally diffusible in water, making it uniformly turbid, not floating in coarse shreds or fragments.

When the greater part of the softer and liquid substances are thus pressed-out, there remains a comparatively small quantity of tissue, which appears filamentous, with abundant blood-vessels, and, to the naked eye, is spongy and flocculent, like the tissue of a placenta. This is the so-called "stroma" of the cancer; and it differs from that which, in the hard cancers, has been so named (p. 305), in that it is not part of the tissue in which the cancer has its seat, but is probably formed from the proper blastema of the cancer, and is as truly part of the cancer as the cells and other corpuscles are.

Such are the most general or normal characters of the soft medullary cancers. It would be vain to attempt to describe all the varieties to which they are subject by the mingling of cysts within or on the surface of their mass; by hemorrhage into their substance; by inflammation; and by the various degenerations of their proper substance, of the extravasated blood, and of the inflammatory products. There are, I think, no other examples in which the diseases of the products of disease are so frequent, so various, or so confusing as in these.

It is in the medullary cancers alone that the blood-vessels have been minutely studied; and in these alone that it is easy to distinguish the vessels of the cancer itself from those of the organ in which it is seated. M. Lebert and his colleagues have made numerous injections, displaying arteries, capillaries, and veins, arranged in networks of various closeness, in the substance of medullary cancers of the ovary, omentum, uterus, and other parts. They have thus disproved the belief that the vascular system of these tumours is exclusively either arterial or venous. I may add, that the minute blood-vessels, though, in proportion to their size, they are thin-walled and easily torn, have the same structures as those in other new-formed parts.

In some medullary tumours we may notice a remarkable abundance of even large blood-vessels. Next to the proper cancer-corpuscles, they may appear to be the chief constituent. The cancer that contains them may thus appear, in many respects, like an erectile tumour, and may often vary in size, according to the fulness of its blood-vessels. (See p. 377, note.) When the blood-vessels are chiefly arterial, the whole mass of the tumour may have a soft full pulsation—a condition which seems peculiarly apt to be found when the tumour is in part imbedded in, or supported by, bone, and in part held down by fibrous tissue, such as that of the periosteum.*

To the same abundant vascularity of these tumours we may ascribe not only their liability to internal apoplectic hemorrhage,† but the great bleedings that may ensue when they protrude through ulcers, or are wounded. I have twice seen the difficulty of distinguishing a medullary cancer of the testicle from an hæmatocele enhanced by the fact, that when the swelling was punctured with a trocar, blood flowed in a full stream through the canula, and continued so to flow till the canula was withdrawn. The size of the swelling was not diminished, as that of an hæmatocele would have been, by the abstraction of the blood; and in both cases it proved to be a large medullary cancer, very vascular and very soft. So, when such tumours are cut-into in the limbs, the vessels that bleed are far larger and more numerous than in any other tumour, except the erectile.

The vessels, moreover, often appear defective in muscular power; for, as Mr. Hey‡ noticed, the bleeding from them scarcely decreases even when a tourniquet compresses the main artery of the limb. It is as if they could not con-

* See Mr. Stanley's paper on the "Pulsating Tumours of Bone," in the Med.-Chir. Trans. vol. xxviii. 303.

† It is chiefly to the medullary tumours changed by internal, and prone to external, hemorrhage, that the name of fungus hæmatodes has been applied.

‡ Observations in Surgery, p. 258.

tract so as to close themselves, even when the force of the blood is diminished to the amount with which it traverses the anastomosing channels.

Lastly, we may connect with the great vascularity and rapid growth of these soft tumours, the large size of the veins near them ; though this is not peculiar to them, but is found, I think, with nearly all tumours that grow rapidly and to a large size.

Lymphatics have been injected in two specimens of medullary cancer of the stomach and of the liver, by Schroeder van der Kolk.* In both instances the vessels passed into the very substance of the cancer.

Of nerves, I believe that none have been found in these or in any other cancers, except such as they have involved in their growth.

The same structures which alone form the separable medullary cancers may be infiltrated among the natural structures of parts. Thus infiltrated, the natural structures are expanded and rarefied ; sometimes, indeed, they seem to be, in a measure, thus changed, even before the cancerous material is deposited among them.† Finally, most of them disappear, as in the infiltrations of scirrhous cancer; and the cancerous mass may now seem like a separately-growing tumour; or, when its material is very soft, it may appear as a quantity of creamy liquid, collected, like the pus of an abscess, in a defined cavity.

Exceptions to the general rules of the wasting of the infiltrated tissues are often observed in the fibrous tissues and the bones: both these may increase during soft cancerous infiltrations.

* Lespinasse: De vasis novis pseudomembranarum, 1842, p. 41.

† Walshe, l. c. p. 555.

Medullary cancers may be found in the articular ends of bones, forming distinct tumours round which the walls of the bone are expanded in a thin or imperfect shell. But more commonly the cancer is infiltrated. In these cases, it usually occupies, at once, the cancellous tissue, the wall of the bone, and the periosteum: and it seems probable that the disease begins simultaneously in all these parts; or, at least, that when they are affected in succession, it is not generally by extension from one to the other. Hence we commonly find that a tumour surrounds the bone, or, in the case of a flat bone, covers both its surfaces; and that the portion of bone thus invested is itself infiltrated with cancer, which is collected most evidently, but not exclusively, in its cancellous tissue. When a medullary tumour thus surrounds a long bone, it is usually of unequal thickness: when both surfaces of a flat bone are covered, the tumour is usually biconvex lens-shaped, and is, on both surfaces, of nearly equal extent.

The periosteum may seem to be continued over a medullary cancer thus placed; but is really, with the exception of a thin outer layer, involved in it, and intersects its substance. The intersecting portions of periosteum chiefly traverse the exterior tumour, extending from the layer which invests its surface to the wall of the bone. They form branching and decussating shining bands, which to the microscope present a perfect fibrous tissue infiltrated with the cancerous materials. They may, also, be much increased by growth, so as to give the section of the tumour an appearance of "grain," or of a tissue with fibres set vertically on the bone. Or, the periosteal tissue thus growing may ossify. In this event, it forms, in a large majority of cases, a light, spongy, and friable growth of bone, which is like an internal skeleton of the cancer.

Most of the specimens of "spongy" or "fungous" exostoses are such skeletons of cancers, examined after the maceration and removal of all the morbid structures that filled their interspaces. The new bone is often formed in thin plates and bars or fibres, the chief of which extend outwards, at right angles to the surface of the bone on which they grow; they may pass deeply into the substance of the cancer, but they seldom reach its outer surface: no medulla is formed with them; and they sometimes form a denser and harder tissue, like that which belongs to the osteoid cancers (see p. 246).

In the walls, or compact substance, of the bone thus enclosed by cancer, it is common to find the laminæ separated by cancerous deposit, mingled with a ruddy, soft, material like diploe. In other cases, the structure of the walls is rarefied, and converted into a light, soft, and porous or finely spongy tissue, whose spaces contain cancer-structures. The Haversian canals, also, may be enlarged; cancerous matter being formed within them. Sometimes, a peculiar appearance is derived from an unequal separation of the laminæ of a bone's walls; large spaces being found between them, like cysts, which may be filled with blood or softened cancer.

Lastly, in the diploe or cancellous tissue, a corresponding state exists. The soft cancerous material excludes the medulla, and, commonly, its formation is attended with a disturbed growth of the bony cancelli, so that they form a finely spongy, dry and brittle structure, or more rarely a dense and hard structure, resembling the skeleton of the external mass of cancer.*

* I have twice seen a formation of very firm fibrous substance, like the basis of the osteoid cancers, in the cancellous tissue of bones that were surrounded with very soft medullary cancer. I have, also, seen a light brittle skeleton formed in the cancer external to a bone, of which the cancellous tissue was converted into hard osteoid substance.

It remains that I should describe the FIRM MEDULLARY CANCERS.

In all their general relations,—as to seat, shape, size, and connections,—these correspond with the softer kind. Like them, they may be separate masses, or infiltrated; may have distinct investing capsules, or may extend indefinitely in the proper substance of organs; like them, they are apt to affect a certain part or place rather than a single tissue: or may be the seats of various degeneration or disease: their only peculiarities are in their own structures.*

They are firm masses: not hard, like scirrhous cancers; but firm, elastic, tense, compact, and moderately tough; they are as tough as the more pliant examples of fibrous cartilage, and merge into exact likeness to the less hard and more elastic scirrhous cancer. They are not evidently fibrous, but tear or split as very firm coagulated albumen might. Their cut or torn surfaces appear peculiarly smooth, compact, shining, and sometimes translucent: in some instances, they are uniform and without plan; in some, more regularly and minutely lobed, or even imitating the appearance of any gland, such as the mammary or parotid, in which they lie. Sometimes they present a strongly marked grain, as if from fibres: but this results, I believe, from a peculiar fasciculate and linear arrangement of elongated cells.

In colour, the firm medullary cancers are hardly less various than the softer kind. They may be pure white; but more often are white, tinted or streaked with pale pink, or yellow; or they may be in nearly every part buff-coloured, or grey; or these tints may be mingled and mottled with

* Generally, I think, when they affect bones, the osseous tissue is apt to soften and waste, rather than to grow as it does in the soft medullary cancerous affections. Certainly, the firm medullary cancers rarely have internal skeletons.

blood-colour, though not so deeply, or with such effusions of blood, as are frequent in the softer tumours.

On pressure, especially after contact with water, they generally yield a characteristic creamy or greyish fluid, which sometimes appears strangely abundant, considering their firmness of texture. In a few instances, however, this character is wanting; the firmest tumours may give only a thin turbid fluid.

Among the points of contrast, in the descriptions of medullary and scirrhous cancers, is the wider range of variety exhibited by the former in the original characters of its growths. For the diversities which I have been describing are not to be referred to changes ensuing in different stages of the same disease; the firmer cancers do not gradually become soft, nor the soft become firmer; they are not to be connected (as the chief varieties of scirrhous cancer may be) with the acute or chronic progress of the disease, or with its different modes of growth, or with the differences of age in which it occurs: rather, the peculiar features of each specimen, and of each chief group, appear to be original and constant,—provided they are not affected by degeneration or disease. Now, equal diversities exist in the microscopic structures of medullary cancers. There are, indeed, certain characters to which nearly all are conformed: the microscopic diagnosis is, therefore, seldom difficult, very seldom doubtful; yet many varieties of appearance need to be learnt, both that the disease may be always recognised, and that we may, if possible, hereafter accurately divide the inconveniently large group into smaller ones. At present such a division is impracticable; for we can only sometimes trace a correspondence between a peculiarity of microscopic structure, and one of general aspect, in the tumours; but it should be a chief object of future enquiries.

The varieties exist in both the corpuscles and the basis, stroma, or intercellular substance of the cancers.

Among the corpuscles, the most frequent, and that which seems the normal, form, is that of nucleated cells, which, in all essential characters, are like those of hard cancer (p. 298, fig. 42). Examples of such cells may be found in nearly every specimen, although, in certain instances, other forms may predominate over them. There is, I believe, no mark by which they may be always distinguished from the cells of hard cancers. They may be softer, less exactly defined, more easily disintegrated by water, flatter than the cells of scirrhous cancer are; but there is in these things no important distinction. The only constant difference is in the modes of compacting, and in the relations of the cancer-materials to the natural structures in which they are placed. Cells such as, in scirrhous cancers, are closely placed, with a sparing, firm, intermediate substance, or are tightly packed among the contracted structures of a mammary gland, are in the medullary cancers more loosely held together, in a more abundant, and much softer or liquid intercellular substance.

The chief varieties of microscopic forms in medullary cancers may be described as affecting, severally, the nuclei, the cells, and the intercellular substance; and it may be generally understood that each peculiar form may occur in combination with a predominant quantity of the ordinary or typical cancer-structures, or may, in rarer instances, form the greater part, if not the whole, of a cancerous mass.

(*a*) Free nuclei, suspended in liquid or imbedded in a soft, nebulous, or molecular basis-substance, may compose the whole of a very soft medullary cancer. Appearances of cells may be seen among them, because of the adhesion of the basis-substance to them; and appearances of many-nucleated cells, when fragments of the basis are detached in which several nuclei are imbedded. But certainly, in many instances, formed cells are rare or absent: the structure is as if abundant nuclei were developed in a blastema, but had not appropriated the several portions of it, which in further development might be shaped into cells.

FIG. 47.*

The nuclei (Fig. 47) are like those of the typical cancer-cells (p. 298); they are oval or round-oval, having a long diameter of from $\frac{1}{2500}$ to $\frac{1}{2000}$ of an inch, bright, pellucid, perfectly defined, largely, and often doubly nucleolated.

It is in the structures thus formed that the minute blood-vessels of cancer may be best examined without injection; for the soft material in which they ramify may be washed away from them, so as to leave them nearly alone, and fit for examination as transparent objects.

(*b*) Free nuclei (Fig. 48), which may be considered as grown or developed, are often mixed, in various proportions, with other cancer-structures. Some, retaining the usual shape, are much larger than the average: others, rarer and more peculiar, are elongated, narrow, strip-like, caudate, or pyriform. Some of these are very small, slender, and apparently of simple structure: others more nearly acquire the size and other characters of cells. Their contents are not so simple and pellucid as those of ordinary nuclei; in the

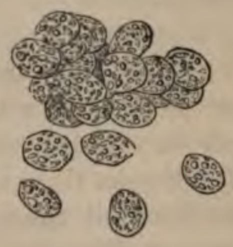
* Fig. 47. Nuclei of soft medullary cancer, imbedded in a molecular basis-substance, without cancer-cells. Magnified 500 times.

smaller they are darkly dotted or granular, but no contained particles appear larger than common nucleoli. In others, larger, oval, pellucid corpuscles, like small nuclei, are contained; and these seem to be formed by the enlargement of the nucleoli, which thus approach or attain the characters of nuclei, while the nuclei that contain them are advanced to the condition of cells. Most commonly, the cells, that thus seem formed out of nuclei, are singly nucleated; but two or three nuclei are found in a few of large size.

FIG. 48.*

(*c*) In a few specimens of medullary cancer of the breast (p. 381), and of the parotid, I have found the chief constituent to be free or clustered nuclei, of round or round-oval shape (fig. 49) from $\frac{1}{1800}$ to $\frac{1}{2000}$ of an inch in diameter, well-defined, but not darkly, nebulous or molecular rather than pellucid, and appearing to contain four, five, or more shining granules, but no special or distinct nucleolus. They might have been taken for large corpuscles of inflammatory lymph, but that neither water nor acetic acid affected them. They were imbedded in a small quantity of molecular basis, and sometimes arranged in groups, imitating the shapes of acini of glands. A few of smaller size, but similar aspect, appeared to be within cells.

FIG. 49.†



* Fig. 48. Various grown and developed nuclei of medullary cancer, as described in the text. Magnified 500 times.

† Fig. 49. Dotted nuclei of medullary cancer, described in the text. Magnified 500 times.

(*d*) In a remarkable case, lately at St. Bartholomew's Hospital, a woman, 67 years old, had two very large and several smaller tumours connected with the skull, a tumour in the lower part of the neck, and similar small growths in the lungs. They were all very soft, close-textured, white, or variously coloured with extravasated blood, enclosing large cavities filled with bloody fluid. Except that they yielded no creamy fluid till after they were partially decomposed, one could not hesitate to call them medullary cancers. But they were composed, almost exclusively, of round, shaded nuclei, with three or four minute shining particles, and in general aspect very like the dotted corpuscles of the spleen. Many of these were free; but more, I think, were arranged in regular clusters or groups, of from five to twenty or more, composing round, or oval, or cylindriform bodies (Fig. 50). A few similar nuclei were enclosed singly in cells in the cancerous growths in the lungs.

FIG. 50.*

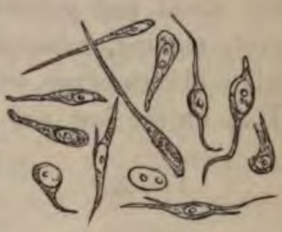
Such are the chief varieties in the nuclei of medullary cancers. Scarcely less may be found in cells, mingled, let me repeat, in diverse proportions, with cells or nuclei of typical form, and rarely surpassing them in number.

(*e*) Besides those varieties in the shapes of cells, which were described among the microscopic characters of hard cancers (p. 298), and which are equally, or with yet more multiformity, found in these, we may note the occasional great predominance of elongated caudate cells in some examples of medullary cancers. I have hitherto observed

* Fig. 50. Clustered nuclei of a medullary cancer, described in the text. Magnified about 400 times.

this in none but some of the firmest specimens of the kind. Many such contain only typical cancer-cells; but in some the caudate and variously elongated cells predominate, and, by their nearly parallel and fasciculate arrangement, give a fibrous appearance to the section of the tumour. The adjacent sketch (Fig. 51) is from the cells of a very firm tumour that grew round the last phalanx of a great toe.† Its cancerous nature was proved not only by its structure, but by its recurrence after amputation, and by similar secondary disease of the inguinal glands. I found scarcely any cells but such as are drawn. Some were narrow, tongue-shaped, broad, and rounded or truncated at one end, and at the other elongated and tapering. Some were elongated at both ends; some oat-shaped; some very slender, with long awn-shaped or cloven processes. All these had large, oval, well-defined, clear nuclei, like those of ordinary cancer-cells, and with distinct nucleoli. Their texture, also, appeared to resemble that of common cancer-cells; they differed only in shape, being, in this, most like the cells of recurring fibroid tumours (p. 156).

FIG. 51.*



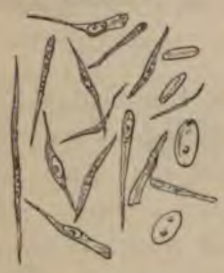
(*f*) In two instances, I have found cancers which, by their general characters and history, should be called firm medullary cancer, and which were, in great part, composed of much smaller, narrower, and proportionally more elongated cells than those last described. One of these was a large deep-seated tumour behind the inner ankle and in the

* Fig. 51. Caudate and variously elongated cells of a firm medullary cancer, described in the text. Magnified 450 times.

† Mus. Coll. Surg. 252; and of St. Bartholomew's, Series xxxv. No. 54.

sole of the foot, enclosing the posterior tibial and plantar vessels and nerve, and the flexor tendons. In the other case, the primary tumour involved the gum and larger part of the front of the lower jaw; and similar secondary disease was diffused through part of the right lobe of the thyroid gland, and, in small masses, in both lungs. All the tumours were very firm and elastic; the fluid that they yielded was not creamy, but viscid and yellowish. The tumour on the foot was grey, shining, minutely lobed, intersected with opaque-white fibrous bands, and in its own tissue appeared fibrous. That on the jaw was greyish-white, suffused with pink, glistening, but with no appearance of fibrous or other texture. In all there were much molecular matter and granular débris, cancer-nuclei, and a few cells of ordinary form; but their essential structures were (as in Fig. 52) very small, narrow, and elongated cells and nuclei. The cells were of various shapes; some sharply caudate, some swollen in the middle, some abruptly truncated. They looked wrinkled and very pellucid. They measured, generally, about $\frac{1}{1000}$ of an inch in length. Some had elongated clear nuclei; in others no nuclei appeared. Many free nuclei had the same shapes as these cells, and of many corpuscles it was hard to say whether they should be called cells or nuclei.

FIG. 52.*



(*g*) Sometimes one meets with cells, in medullary cancers, in which nuclei are not at first discernible. They are round, large, nebulous; they contain many minute granules; and, when water is added, it diffuses their contents, and may

* Fig. 52. Small elongated cells and nuclei, with nuclei of ordinary shape, from a firm medullary tumour, as described above. Magnified 500 times.

display a round nucleus, smaller, and more nebulous or granular than those of the typical cancer-cells.

(*h*) Cells containing many nuclei are regarded by some as frequent in certain medullary cancers. I believe that such cells may occur, and that occasionally endogenous cells may be found within those of larger size and probably older growth: but I am more sure that cells containing cells, or containing more than three nuclei, are very rare. What have been described as brood-cells in medullary cancers, or as cells which, by the multiplication of their nuclei, were effecting rapid increase of the cancer, were, I believe, in some instances, the many-nucleated cells of myeloid tumours, and, in more instances, detached masses or fragments of molecular basis-substance in which nuclei were imbedded. I may add, that I have not found, in medullary cancers, any structures similar to those of the laminated cysts or capsules which occur in epithelial cancers.

Such are the chief varieties of the corpuscles of medullary cancer: these, at least, are what I have found them presenting in their natural state. Much might be said respecting the changes effected in them by the fatty and other degenerations and diseases, and about the confusion brought into the microscopic diagnosis by the granular masses, free granular matter, and various débris hence derived. But for these I must refer to the last lecture, and to the general account of degenerations in the first volume.* It remains that I should speak of the substance with which the cells are associated—the basis, intercellular substance, or stroma.

I need not repeat what has been said (p. 305) respecting the "stroma," so-called, of a cancerous infiltration,—that it is only the tissue of the organ in which the cancer is

* Or, with more advantage, to Lebert's admirable account of the changes of the cancer-cells, in his "Traité pratique," p. 23.

seated. What I have now to describe is the substance which is proper to the cancer, and in which the cancer-corpuscles are suspended or imbedded.

(*a*) The cells and nuclei of medullary cancers may be suspended in liquid alone; and the two, like a collection of fluid rather than like a tumour, may be infiltrated in tissues, or, more rarely, may be contained in small cavities. This is not unfrequently the case in very rapid productions of cancerous matter, especially in secondary deposits. The liquid (cancer-serum, as it has been named) is turbid; it dims transmitted light, and has a finely molecular appearance. With the cancer-corpuscles, and usually with granular matter, it makes the "cancer-juice;" the peculiar thick, creamy liquid, tinted with yellow, grey, pink, or purple, and easily diffusible in water. The quantity of corpuscles in proportion to the liquid is various; it may be so small, and the corpuscles themselves may be so lowly developed, that the liquid, like a mere blastema, may appear the chief constituent of the cancer.

(*b*) The same kind of liquid which, in the cases just referred to, forms the only material suspending the corpuscles, exists, also, in the solid medullary cancers: it is the liquid of the "cancer-juice." But in the more solid growths it appears to be diffused through some solid tissue, or in the interspaces of a kind of spongy texture. This, which may be more properly called a stroma of medullary cancer, is, in its simplest form, a nearly pellucid substance, having either no trace of structure, or only imbedded roundish or elongated nuclei; but sometimes it appears fibrillated.

(*c*) Sometimes a frame-work, enclosing and supporting cancer-cells, appears to be formed by elongated fibro-cells arranged in series of communicating lines. But, more commonly, a frame-work is constructed of delicate pellucid or nucleated membrane, with filamentous tissue. In the last case one obtains from a medullary cancer, after expressing as much as possible of its "juice," a kind of sponge, flocculent and shreddy, constructed of membrane and filamentous tissue, with blood-vessels and still-adhering cancer-particles. One thus sees that, in even the minuter parts, the substance of the growth is intersected with such partitions as are visible with the naked eye, separating its larger lobes.

(*d*) Lastly, when medullary cancer is formed in bone or periosteum, these tissues may, as I have said, grow excessively, and make for it a fibrous or osseous skeleton (p. 363). Or, in other cases, new fibrous or osseous tissue may be formed in the cancer, apparently by the development of its own blastema, and may be as a stroma for the cancer-cells. Medullary cancers thus composed are the chief examples of transition-forms to the scirrhous cancers, on the one hand; and, on the other, to the osteoid cancers, in which the cancer-cells are wholly or nearly superseded by the imperfect ossification of the cancerous blastema.

Rokitansky has lately published an essay* on the development of the stroma or skeleton of cancers, an abstract of which, with copies of some of his illustrations, may find here an appropriate place. It relates, almost entirely, to that kind of stroma, in medullary cancers, which is described above (*c*, p. 374).

In certain examples of such a stroma or skeleton, two interlacing networks, or meshed structures, may be seen (Figs. 53, 54). One of these (*b*) consists of slender bands, beams, or tubes (Fig. 53, *c*) of an hyaline substance, which contains oblong nuclei, and may be in part fibrillated or transformed into filamentous tissue. The other and younger

* Ueber die Entwickelung der Krebsgerüste, 1852, from the Sitzungsberichte der kais. Akademie.

structure (*a*) is composed of larger opaque bands or beams, which are made-up of nucleated cells, with elementary granules, and variously perforated. These form a net-work interlacing with that formed by the hyaline structures. Moreover, with these opaque beams, formed of the same structures, and projecting from them, or from the hyaline structures, there are hollow flask-shaped or villous processes or outgrowths (Fig. 53). Many of these pass through the apertures or meshes in the networks, projecting through them with free ends; and the apertures with which many of them are perforated, enlarging by absorption, give them the appearance of netted hollow bands or cords. Some of these same processes, also, appear pellucid,

FIG. 53.*

FIG. 54.*

* Figs. 53 and 54. Development of cancer-stroma, described in the text. Magnified 90 times. From Rokitansky.

hyaline, and nucleated at their bases or pedicles of attachment, or through more or less of their length.

These several conditions of the stroma indicate, Rokitansky says, that it is constructed on that plan of "dendritic vegetation," of which the type and best example is in the villous cancers. The growth of the stroma takes place, at first, in the form of hollow, flask-shaped, budding and branching processes or excrescences, which are composed of hyaline membrane, and filled with nucleated cells and granules. These processes constantly increase, throwing out fresh off-shoots of the same shape as themselves first had (comparably with the increase of the exogenous villi of the cystic chorion described at p. 62). At the ame time the cells, or part of the cells, within the processes unite or fuse their cell-walls, while their nuclei remain and are elongated. Thus the texture of the growing stroma becomes hyaline, nucleated, or at last filamentous, and tubular; and, as apertures are formed in it by partial absorption of its textures, it becomes also meshed and reticulate or sponge-like. Fresh dendritic vegetations arising, on the same plan, from the net-work thus formed, pass with interlacements through its meshes; and, by repetition of the changes just described, increase the stroma and the complexity of its construction.

The production of cancerous elements is commensurate with the growth of the stroma, and they fill all the interstices, as well as, in some cases, the tubules of the net-works.*

The foregoing descriptions, though illustrated by only a few examples, might suffice, I believe, for the medullary

* Rokitansky holds that the same method of construction is to be traced in the formation of the layers of false membrane, which are found with reticulate or areolar surfaces, or, later, with interlacing laminæ of fibres, on the pleura and other serous membranes. He illustrates it, also, by the reticulate deposits on the interior of arteries; and lastly, by the examples of cavernous or erectile tumours, *i. e.*

cancers of nearly all parts. Yet it may be useful, if, after the example of the other lectures, I describe some of the peculiarities which this form of cancer presents in certain organs,—making a selection on the same grounds as in the last lecture (p. 310).

In the TESTICLE, the medullary cancer is, usually, of the softer kind: the firmer kind is not uncommon; but examples of the scirrhous, or any other form of cancer, except the medullary, are of exceeding rarity.

The medullary cancer commonly appears as a regular oval, or pyriform mass, which the toughness of the enclosing fibrous coat of the testicle permits to grow to a great size without protrusion. As the fibrous texture is distended by the growth, so it commonly also increases in thickness.

not of such as he admits to be formed by dilatation of blood-vessels, but of such as are entirely new-formed structures. I have supposed these (see p. 281) to be new growths, in which the blood-vessels greatly enlarging produce the character of an erectile tissue. Rokitansky says that processes spring from the bands and the cords of the cavernous tissue of such tumours, which processes end with flask-shaped swellings, and are either opaque, and formed of nucleated cells, or are formed of nucleated hyaline tissue, or of long fibro-cells, or of fibro-cellular tissue. From these likenesses he deduces for the cavernous tumours the same plan of development as for the stroma of cancer. He believes, moreover, that the blood which some of them contain is formed in them; saying that, in small lately-formed erectile tumours, no anastomosis between their blood-spaces and the blood-vessels in the parts around them can be found.

Lastly, he says (and the statements may be added to what is mentioned at p. 286) the affinity of the cavernous blood-tumour with cancer is more than a formal one. They not unfrequently exist together in the same organ, *e. g.* in the liver; and the stroma of the cancer may be exactly like the mesh-work of the vascular tumour. Cavernous tumours, also, may be found in large numbers at once in the most different organs and tissues: for example (as in a case related by him), in the whole peritoneum, the costal pleura, the subcutaneous tissue, one of the psoas muscles, the choroid plexuses, and the fat at the base of the heart.

The surfaces of the tunica vaginalis are generally partially adherent; and what remains of the cavity, usually at its upper part, is filled with serous or blood-tinged fluid. Part, or the whole, of the glandular tissue of the testicle may, I think, be always found outspread on the surface of the tumour: the epididymis, often the seat of similar disease, is generally flattened and expanded. Separate medullary cancers may lie near; especially in the loose cellular tissue of the spermatic cord: or, the growth may perforate the tunica albuginea, and extend exuberantly about the testicle in the sac of the tunica vaginalis, or in the loose tissue of the scrotum: or, without communication, part of the cancer may be within, and part around, the tunica albuginea.*

The general characters of the cancer-structure in the testicle are usually conformed to the type already described yet these points may be considered worthy of note: (1) Sometimes the lobes of the cancerous mass are severally so invested with fibro-cellular tissue that they may have the appearance of cysts filled with endogenous cancerous growths.† (2) Portions, or whole lobes, of the tumour, degenerate and withered into a yellow substance, like tuberculous or "scrofulous" matter, are usually seen; especially near the central parts of the cancer. (3) Large cavities full of blood may exist, and add to the difficulty of the diagnosis from hæmatocele. (4) The conjunction of medullary cancer with cartilage is more frequent in the testicle than in any other part (see p. 208). (5) The disease very rarely affects both testicles, either at once or in succession.

* Mr. Prescott Hewett showed me a specimen in which a healthy testicle was surrounded by medullary cancer. Examples of similar cancers in the spermatic cord, the testicles being healthy, are in the College-Museum, No. 2462-3: some affecting the undescended testicles are related by Mr. Arnott (Med.-Chir. Trans. xxx. p. 9.)

† Mus. Coll. Surg. No. 2396.

The medullary cancer of the Eye so rarely deviates from the general characters of the disease, and, since Mr. Wardrop's first account of it, has been described, in all works in Ophthalmic Surgery, so much more fully than would here be reasonable, that I shall advert to only two points which it illustrates. (1) It is especially apt to present, either in parts or throughout, the melanotic form; a fact which we can hardly dissociate from that of its growth near a seat of natural black pigment, and which illustrates the tendency, even of cancers, to conform themselves, in some degree, to the structures of adjacent healthy parts. (2) It shows a remarkable disregard of tissue in its election (if it may be so called) of a seat of growth. I fully agree with M. Lebert in his denial of the opinion that either the retina, or any other tissue of the eye-ball, is in all or even in a large majority of cases the place of origin of the cancer. Rather, we have, here, a striking instance of what may be called the *allocation* of cancers: of their growth being determined to certain places rather than to certain tissues. Any of the tissues within or about the globe of the eye, or any two or more of them at a time, may be the primary seat of the cancer; and, probably, each of them is more liable to be so than any similar tissue elsewhere is: the locality, therefore, which they all occupy, may be assumed as that to which the cancerous growth is directed, rather than any of the tissues themselves. And so it appears to be, when, after extirpation, the cancer returns, as if with preference, in the same locality, although the whole of the first growth, and of the tissues which it occupied, are removed.

The Breast is among the parts which are most rarely the seats of medullary cancer. So rare, indeed, is well-marked medullary cancer of the breast, in this country, that Mr. Lawrence, in his immense experience, has met with but two examples of it; and, in our Museums, it is very rarely seen. This rarity is the more remarkable by its contrast with the occurrence of the disease abroad. In France, according to M. Lebert,* about one-fifth of the cancers of the breast are "soft and encephaloid." In America, Dr. J. B. S. Jackson has assured me that the proportion is not less than one-fifth; and I gather, from the records of German writers, that it is with them about the same.

I have never seen, in the recent state, a medullary cancer of the breast which had a brain-like or any other usual appearance:† but I have observed four cases of what must be regarded as medullary cancer, though widely deviating from the usual characters, and not resembled by any of the same kind except some of those occurring in the brain. They may be worth description, because they are with difficulty distinguished from hard cancers, on the one hand, and from mammary glandular or cystic tumours, on the other. If a general description may be drawn from these few cases, it may be to the following effect.

The tumours are separable masses, closely connected with the surrounding mammary gland or fat, but not incorporated with them, and having, in some instances, distinct thin capsules,—a character at once distinguishing them from all the scirrhous cancers of the breast that I have yet seen. They are, generally, seated on or near the surface of the gland, "floating," as mammary glandular tumours often do. The skin over them is upraised, thin and tense; not depressed, or morbidly adherent, or itself cancerous; but when ulceration is at hand, becoming livid,

* Des Maladies Cancereuses, p. 326.

† I do not so consider two specimens in the Museum of St. Bartholomew's, Series xxxv., 28, 29, removed from the front of the chest after amputation of the breasts on account of extreme hypertrophy.

then ulcerating sparingly, and then everted with the protruding and outgrowing tumour. The tumours are oval, flattened, rounded, or nodular; firm, sometimes very firm, but not hard or very heavy like scirrhous cancers, and at or about their centres they feel like cysts tensely filled with fluid. They may grow quickly, and to much larger size than scirrhous cancers; are not remarkably painful; and appear prone to be associated with the formation of large serous cysts. Their general history is that of ordinary medullary cancers.

With these characters alone, the diagnosis of such medullary cancers of the breast is very difficult; all these equally belong to mammary glandular tumours or proliferous mammary cysts. But the same disease may exist in the axillary lymphatic glands, forming quickly-growing masses, apt to be much larger than those in scirrhous cancer. And, if ulceration ensue in the tumour, it becomes exuberant, with lobed and coarsely granulated firm growths, discharging offensive ichor, and sometimes profusely bleeding.

When such tumours are removed, they are found, as already stated, separable from the mammary gland; it is pressed away by them, but is itself healthy. The section of the tumour is minutely lobed, with lobes or "granulations" closely grouped, like those of a mammary glandular tumour. Their texture is close, more or less firm, easily crushed, shining on the cut surface. In colour, they are greyish, varied with dots and irregular lines of yellow (which do not follow the course of the gland-ducts), or, in parts, suffused with livid or deeper purple tints. Parts of them, or even whole lobes, may be soft, shreddy, pale yellow, like tuberculous infiltration; and these seem to be portions that are degenerate and withered, like the tuberculoid materials in other medullary cancers. They yield, not a creamy fluid, but a turbid greyish, or viscid yellowish one. In some instances large cysts lie in or upon them, filled with serous, or blood-stained, or darker fluid.

In microscopic examination traces of a glandular acinous plan may be again observed: the corpuscles of the tumour being, at least in parts, grouped in round or oval forms, though the groups are not inclosed in membrane. The corpuscles may be well-formed cancer-cells and nuclei imbedded in molecular substance. But I have also found in them, with these or alone, abundant nuclei (some free and some in cells), such as are described at page 369, fig. 49. It was, chiefly, such nuclei as these which, being clustered, gave the minute appearance of glandular construction: and in some parts, these alone, clustered and close packed, seemed to make up nearly the whole substance of the tumour.

In the Subcutaneous Tissue, or deeper areolar layer of the skin, the medullary cancers, while generally conformed to the type, exhibit these peculiarities:—

(1) They are apt to assume the melanotic state; a fact allied to that already mentioned of the cancers of the eyeball (p. 380).

(2) While, in nearly all other external parts, the medullary cancers appear as single growths, they are here very often multiple. Such numerous cancers may grow after one affecting some distant organ; or may be first formed below the cutis. In the latter case, many may appear coincidently; or, when in succession, none seem to be consequences of the growth of their predecessors; they all have the characters of primary cancers, of "cancers d'emblée." In some cases all the tumours appear in a single region of the body. In an old man, lately under Mr. Lawrence's care, two medullary cancers were removed

from the scalp, and four remained in it. In a case which I shall presently detail a large number were seated on one arm and shoulder, but scarcely any appeared elsewhere. In some cases, on the other hand, they appear at about the same time in many and distant parts; and in some, though limited at first to a single region, they grow successively in other parts more and more widely distant. Such was the event in a remarkable case by Dr. Walshe.*

In this aptness to be the seat of many medullary tumours, the subcutaneous tissue agrees most nearly with the serous membranes and the liver and other glands. The separable tumours are generally isolable, oval, discoid, or lens-shaped: very rarely, I believe, they are pedunculated: they do not commonly grow to a great size, or tend to ulceration or protrusion, unless after injury. But there seems no limit to their number; it is as if the force of the disease, which, in other instances, is spent in a single enormous growth, were here distributed among many.

(3) It is chiefly among these examples of multiple medullary cancers that the occasional disappearance of a cancer, as if by absorption, may be observed. The old man referred to, as under the care of Mr. Lawrence, was admitted because one of the tumours in his scalp was largely and foully ulcerated. The removal of it was deferred on account of the other tumours, and especially on account of one behind the ear; but in the course of about a month this almost wholly disappeared. The largest of those remaining was now removed; and during the healing of the wound the rest nearly disappeared, becoming gra-

* Medical Times and Gazette, Aug. 21 and 28, 1852. In his Treatise on Cancer, Dr Walshe gives a full analysis of all the cases previously published. See, also, the singular case recorded by Mr. Ancell (Med.-Chir. Trans. xxv., p. 227.)

dually smaller and firmer. So, in the case of multiple tumours of the arm, before the patient died, the whole of the smaller tumours were completely removed during the sloughing and suppuration of the larger.

The Lymphatic Glands, so rarely the seat of primary scirrhous cancer, are often primarily affected with medullary cancer. They are, indeed, less frequently so affected than they seem to be; for, in some instances, when the disease seems primary in them, it is only because of its predominance over that in the organ with which they are connected. But, in more instances than these the glands are first, and, for a time, exclusively affected. The most frequent seats of such primary disease are the cervical, inguinal, lumbar, axillary, and mediastinal glands: in a few very rare instances nearly the whole lymphatic system has quickly become cancerous.

The primary cancer of the lymphatic glands usually affects, from the first, more than one gland; often, it extends through a whole group, and so many tumours form in a cluster that one may doubt whether all of them are in glands. They may present any of the various forms of medullary cancer; and these peculiarities may be noticed in their course: (1) They are rarely well marked in the first instance; they appear like merely enlarged glands; their constant and accelerating increase may alone suggest the suspicion of the nature of the disease. (2) Cyst-formation is frequent in connection with them. Especially, I think, in the neck, one may find serous cysts, in elderly persons, resting on clusters of cancerous glands, and the cysts may be often evacuated, and will fill again, while the main disease makes insidious progress deep in the neck. (3) Partial suppurations may occur in the cancerous glands, rendering the diagnosis for a time still more difficult. (4) It is especially among the cases of cancerous lymphatics that we may find those occurrences of deep connection, and of enclosing of large nerves and blood-vessels, to which I have referred (p. 357). (5) Cancerous lymphatic glands often give a fallacious support to the belief that innocent tumours are apt to become cancerous; for the glands sometimes enlarge before the cancerous disease is established in them; and since, in their simple enlargement, they are like simple tumours, there is an appearance of transmutation, when in such a state they become the seats of cancer.

In the RECTUM, and in other parts of the digestive canal, I have already said that growths of medullary cancer may coexist with scirrhous cancer. Whether in this combination or alone, the former disease may appear in at least three distinguishable forms. (1) It consists sometimes in diffuse infiltration of creamy, white, or greyish cancerous substance in the submucous tissue, the mucous membrane being, for a time, healthy, but raised into the canal with low unequal elevations. (2) Much more commonly, larger, and more tuberous circumscribed masses grow in the submucous tissue, projecting and soon involving the mucous membrane, then exuberant through ulcerated apertures in it, and often bleeding. (3) With nearly equal frequency the disease has its primary seat in the mucous membrane. Here it forms broad, circular, or annular growths, of a soft, spongy, and shreddy substance. They are but little raised above the level of the mucous membrane, unless it be at their margins, which are usually elevated and overhanging, and when ulcerated sinuous and everted. They are very vascular, justifying Rokitansky's expression that the blood-vessels of the affected part of the membrane have assumed the characters of those of an erectile tissue. They might produce little stricture of the canal, if it were not that they are, I think frequently, associated with thickening and contraction of the tissues external to them.

It hardly needs to be added that in whichever part of the intestine the disease commences it extends to the rest, and from them to the surrounding tissues; exemplifying here as everywhere the coincident processes of destruction and of more abundant formation.*

* When I have omitted all description of the medullary cancers of the uterus, lungs, brain, and many other organs in which they frequently occur, it will not, I hope, be forgotten that my purpose is only to illustrate the general pathology of the disease by the best examples which I have been able to study. To have entered further on the special pathology of cancer in each organ would have been beyond my purpose, and quite superfluous while the great works of Walshe and Lebert can be consulted.

LECTURE XI.

MEDULLARY CANCER.

PART II.—PATHOLOGY.

THE general history of medullary cancers presents the best marked type of malignant growths. Among all tumours, they appear, in a general view, the most independent of seat and of locality; the most rapid in growth; the most reckless in the invasion of diverse tissues; the most abundant in multiplication: they have the most evident constitutional diathesis; they are the most speedily fatal. All these facts will be illustrated by comparison of the following sketch with the corresponding histories of the other forms of cancer.

(*a*) Among the conditions favouring the production of medullary cancer, the peculiarities of the female sex, though not without influence, appear far less powerful than they appear in the history of scirrhous cancers. The peculiar liability of the uterus so much surpasses that of any of the male organs of generation, that women are certainly, on the whole, more liable than men are to this form of cancer. But when the medullary cancers of the generative organs of both sexes are left out, I cannot find, either in my own tables or in those of Dr. Walshe and M. Lebert, that either sex is notably more liable than the other to medullary cancer of any part of the body.

(*b*) The medullary cancer is prone to occur at an earlier age than any other form; it is, indeed, almost the only cancerous disease that we meet with before puberty. The three localities in which, according to M. Lebert,* cancer occurs at the lowest mean age are (in the order of their liability), the eye, the testicle, and the osseous system. To these, while confirming his observation, I would add the intermuscular spaces, and other soft parts of the trunk and limbs. The mean age of the occurrence of cancer in these parts is under 40; in all other parts it is above 40, and in most of them above 50. Now the four localities named above are those in which the medullary and melanotic cancers almost alone occur as primary affections.

From a table† of 154 primary medullary cancers of the bones, soft parts of the trunk and limbs, the eye and orbit, the testicle, breast, and various other external parts, I find that the ages at which they occurred were as follows:—

	Breast.	Soft parts of limbs and trunk.	Lymphatic glands and other parts.	Bones.	Eye and orbit.	Testicle.	Total.
Before 10 years of age	—	2	—	4	15	4	25
Between 10 and 20	—	6	—	12	1	2	21
„ 20 and 30	—	3	3	11	4	12	33
„ 30 and 40	2	3	2	6	2	17	32
„ 40 and 50	2	6	2	11	1	8	30
„ 50 and 60	3	2	3	4	5	3	20
Above 60 . . .	—	1	—	6	3	—	10
	7	23	10	54	31	46	171

* Traité pratique, p. 140.

† The table is constructed from nearly equal numbers of M. Lebert's cases and my own; and it may be worthy of remark, that in the case of every part the average age is higher in his cases than in mine.

The striking contrast between this table and that of the 158 cases of scirrhous cancer (p. 325) needs little comment. Of the scirrhous cancers, not one occurred before the age of 20; of the medullary cancers, more than a fourth began before that age: of the former, nearly half commenced their growth between 40 and 50 years of age; of the latter, little more than a sixth: of the former, nearly three-fourths commenced after 40; of the latter, little more than one-third did so.

The following table, also, may be compared with that at p. 326. It shows, by similar calculations, the relative frequencies of medullary cancers in external parts, in proportion to the number of persons living at each of the successive decennial periods of life. The greatest frequency is between 40 and 50, and, reckoning this as 100, the following numbers may represent the frequencies of the beginning of medullary cancers at other decennial periods:—

0 to 10 years	31	40 to 50 years	100
10 to 20 ,,	38	50 to 60 ,,	99
20 to 30 ,,	59	Above 60 ,,	44
30 to 40 ,,	79		

The chief points which this table may illustrate are (1), that the maximum of frequency, in proportion to the number of persons living at the several ages, occurs between 40 and 50, as well for the medullary as for the scirrhous cancers of external parts; but (2) that there is a gradual ascent to this maximum from the earliest period of life, and then a more gradual descent from it.

I believe, however, that, if we could reckon the frequencies of medullary cancers of internal organs, we should find no such diminution after the age of 50. Rather, it would appear that (in consequence, chiefly, of the frequency of cancer of the stomach in advanced life) the frequency of medullary cancers, in proportion to the number of persons living, continues to increase up to the latest age. There are, I believe, no tables in which the medullary are separated from other cancers of internal organs; but from those of the cancers of the uterus and stomach given by Lebert, and of the lungs by Walshe (of which, doubtless, the majority were medullary cancers), the proportionate frequencies at successive periods appear to be as follows. (For comparison's sake, the proportion between 40 and 50 years is still counted as 100.)

0 to 10 years	. . . . . .	0
10 to 20 ,,	(cancers of the lungs alone)	3
20 to 30 ,,	. . . . . .	15·7
30 to 40 ,,	. . . . . .	51
40 to 50 ,,	. . . . . .	100
50 to 60 ,,	. . . . . .	204
60 to 70 ,,	. . . . . .	236
70 to 80 ,,	(cancers of the stomach almost alone) . .	250

There are no data from which we could exactly reckon the relative frequencies of medullary cancer in each part of the body, but there can, I think, be little doubt that it is a disease which, on the whole, becomes constantly more frequent, in proportion to the number of persons living at each successive period of life, from the very earliest to the latest age.

(*c*) The influence of hereditary tendency is, probably, about the same in medullary as in scirrhous cancer. Among 32 patients, 5 were aware of cancer having occurred in other members of their families, and of these five, four reported that two members of their respective families had died cancerous.

(*d*) Among 57 patients with medullary cancer of external parts, 17 gave a clear history of previous injury or disease of the part affected; in 7 the history was doubtful.

Certainly it would be impossible to prove, in many of these cases, that the cancer was, in any sense, consequent on the injury after which it formed; and yet, while we find that a third of the patients with medullary cancers ascribe them to injury or previous disease, while less than a fifth of those with simple tumours, or with hard cancers, refer them to such cause (p. 329), we cannot fairly doubt that these local accidents have influence in determining the place and time in which the medullary cancerous disease shall manifest itself.

The influence of injury is very clearly shown in certain cases, in which there is no appreciable interval between its immediate ordinary consequences and the growth of a medullary cancer in the injured part. For example, a healthy boy was accidentally wounded in his eye. It had been perfectly sound to this time; but, within a few days after the injury, a medullary tumour grew from the eyeball. It was removed three weeks later; but it quickly recurred, and destroyed life.

A boy fell and struck his knee. It had been perfectly healthy; but the inflammatory swelling (as it was supposed) that followed the fall did not subside: rather, it constantly increased; and in a few weeks it became probable that a large medullary tumour was growing round the lower end of the femur. Amputation proved this to be the case.

Again, a sturdy man, at his work, slipped and strained, or perhaps broke, his fibula. Three days afterwards he had increased pain in the injured part, and at the end of the week swelling, which, though carefully treated, constantly increased. Eight weeks after the injury the swelling was found to be a large medullary growth around and within the shaft of the fibula; and the limb was amputated.

We must, I suppose, assume the previous existence of a cancerous diathesis in the persons in whom these rare consequences of accidental violence ensued: nevertheless, their cases prove, as I have said, the influence of local injury in determining the time and place in which the cancer will be manifested; and they may make us believe that, in many cases, in which a clear interval elapses between the injury and the appearance of the cancer, the effect of the violence, though less immediate, is certain.

(*e*) Although I know of no numerical evidence to support it, yet I think the general impression must be true that medullary cancer is peculiarly liable to occur in those who have many of the features of the fair strumous constitution: in persons of fine complexion, light hair and eyes, pale blood, quick pulse, and of generally delicate or feeble health. Scirrhous cancer appears most frequent in those who have the opposite characters of temperament. A difference also exists in relation to the general health of those in whom the two forms of the disease are severally observed. I mentioned (p. 330) that nearly three-fourths of the subjects of hard cancer appear to have good general health at and soon after its first appearance: the proportion of those in the like condition with medullary cancer is not more than two-thirds; the remaining third have presented from the very beginning a loss of weight and of muscular power, accelerated action of the heart, quick breathing, paleness, and general defect of health.

In the growth of medullary cancer we may chiefly observe these three things—(1) their multiplicity in certain cases; (2) their generally rapid rate of increase; (3) the occasional complete suspension of growth.

I have referred to their multiplicity in the subcutaneous tissue, but again notice it, to mention the observation of Rokitansky,* that medullary cancers are sometimes developed in great number in the course and among the phenomena of a very acute typhoid fever.

I do not know what their greatest rate of increase may be; but it has in several cases exceeded a pound per month, and, except in the instances of some of the cartilaginous tumours (p. 181), it is, I believe, unequalled by any other morbid growth. In general, the more rapid the growth the less is the firmness, and the less perfect the development of nuclei and cells, in the medullary tumour. Their rapid increase commonly indicates, not a special capacity of growth or multiplication of cells in the tumour already formed, but an intense diathesis, an ample provision of appropriate materials in the blood. The growth is by simple increase: the materials once formed do not normally change their characters; there are no stages of crudity or maturity; the disease is, in its usual and normal course, from first to last the same.

But while these things justify the expression that the medullary is, on the whole, the most acute form of cancer, yet there is, I believe, none in which arrest or complete suspension of progress is so apt to occur. These cases have occurred within my own observation. A man, 38 years old, had a slight enlargement of one testicle for 15 years, and its rate of increase was often inappreciable. At the end of this time rapid growth ensued. On removal, well-marked medullary and melanotic cancer was found, and was the only apparent source of the enlargement. He died soon after the operation with recurrence of the disease.

* Pathologische Anatomie, i. 373.

A man, 42 years old, had a large increasing medullary tumour of the ilium. He had also a tumour in the upper arm, which had grown slowly for seven years and had been stationary for three years. When he died, the tumour in the arm had as well-marked characters of medullary cancer as that of the ilium, or of any other of the several parts in which similar disease was found.*

A man, 35 years old, had numerous medullary tumours in his right upper arm, shoulder, and axilla, all of which had commenced their growth within three months, and were very quickly increasing. One, which appeared to be in every other respect of the same kind, had been stationary for twelve years in the groin, and another nearly as long in the neck.

Sir Astley Cooper removed a gentleman's testicle for what was believed to be medullary cancer. He remained well for twelve years, and then died with certain medullary cancer in the pelvis.

Dr. Baly had a patient who had observed for several years a tumour connected with two of his ribs. It had scarcely enlarged, till shortly before his death: then it quickly increased, and, at the same time, numerous medullary cancers appeared about it and in more distant parts.†

Cases such as these occur, so far as I know, in no cancers but those of the medullary and melanotic kinds. They seem to be quite inexplicable; and as yet no facts have been observed which would show a peculiarity of structure in the arrested cancers corresponding with the strangeness of their life.

As the medullary cancers grow, the parts about them

* Museum of St. Bartholomew's, Series i. Nos. 235 to 240. Case related by Mr. Stanley in Med.-Chir. Trans., xxviii. p. 317.

† The tumour on the ribs is in the Museum of St. Bartholomew's. It appears an ordinary medullary cancer, with a hard bony skeleton.

generally yield, and some among them grow at once in strength and in extent, and for a time retard both the increase and the protrusion of the tumour. Because the skin over a medullary cancer is not often infiltrated (as that over a hard cancer usually is), we do not often see the kinds of ulcer described in the last lecture (p. 333). Neither is there, in medullary cancers generally, any remarkable proneness to ulceration. The usual course is, that, as the tumour grows, the skin and other parts over it become thinner and more tense; then, as the growth of the tumour is more rapid than theirs, they inflame and ulcerate, and a hole is formed over the most prominent part of the tumour. There is nothing specific or characteristic in this ulceration; it is only such as may ensue over any quickly growing tumour; but the continued rapid increase of the cancer makes it protrude and grow exuberantly; it throws out fungus, as the expression is. The exuberant growth, exposed to the injuries of the external world, inflames, and hence is prone to softening, bleeding, ulcerating and sloughing.* These may keep down its mass; yet it may grow to a vast size, having only its surface ulcerated; lower down, it usually adheres to the borders of the apertures in the skin, and overhangs and everts them. This is usually the case with the huge outgrowths of medullary cancer that have protruded from the eye-ball, after penetrating through ulcers of the over-stretched cornea or sclerotica. And similar exuberant growths are often seen when medullary cancers have penetrated the walls of various cavities or canals: thus, *e. g.*,

* In Series xxxv. No. 60 in the Museum of St. Bartholomew's, is a large medullary tumour which had grown in the subcutaneous tissue of the back, and, after the skin over it had ulcerated, was in one mass squeezed out through the opening, while the patient was endeavouring to raise herself in bed.

they grow along the canals of veins when they have entered them by, it may be, a single small orifice.

In the cases of diffuse infiltration of an exposed superficial tissue (*e. g.*, of the mucous membrane of the stomach or rectum) the cancer usually ulcerates widely with the tissue it affects, and herein imitates more nearly the characters of the ulceration in scirrhous and epithelial cancers.

Through the constantly deepening cachexia, with which the increase in the medullary cancers is usually commensurate, and which is augmented by the various influences of the local disease, the usual course of the medullary cancer is uniformly towards death; and rapidly thither, even when the growth does not involve parts necessary to life. And yet, as Rokitansky has observed,* there is no form of cancer in which spontaneous natural processes of healing so often occur. Doubtless nearly all the reputed cases of the cure of cancer have been erroneously so regarded; yet instances may be easily gathered of at least temporary cure; and these are important in relation to the general pathology of cancer, since they afford the best examples of the effects of its degenerations and diseases.

The degenerations of medullary cancer are chiefly three: withering, fatty, and calcareous degeneration. Its chief diseases are equal in number—hæmorrhage or apoplexy, suppuration, and sloughing.

A medullary cancer may gradually decrease, becoming harder, as if by shrivelling and condensing, and at length may completely disappear. I have mentioned such cases at p. 384; and I have seen the same happen after partial removal of cancers.

A firm medullary tumour was seated deep in the substance of a young woman's parotid gland. Its removal with

* Loc. cit. p. 375.

the knife could not be safely completed; about a fourth part of it was left behind, and the wound was left to heal in the ordinary manner. It healed quickly, enclosing the remains of the tumour; but after some time all the appearance of swelling subsided, and no renewed growth ensued till after a lapse of three months, when it was renewed, but not more rapidly than before.

A woman's humerus was amputated with a large mass of firm medullary cancer surrounding its neck and the upper part of its shaft. The same disease existed in all the muscles about this part of the bone; and the patient was so exhausted, that the dissection necessary for the removal of the whole disease could not be completed. Large portions of it were left in the deltoid and great pectoral muscles. In two months after the operation, however, the wound had very nearly healed, and no trace could be felt of the masses of the cancer in the muscles. Nor did any perceptible recurrence take place till more than four months after the operation. At that time renewed growths appeared at the scar, and in the thyroid gland, and quickly increased.

To these cases I might add at least three in which I have known portions of cancerous growths left in the orbit after incomplete operations; in all of which complete healing ensued, and one, two, or three months elapsed before any renewed growth was evident in the portion of disease that was left. In all these cases the disappearance of the cancer may have been due in part to the disease and rapid degeneration excited in it by the injury of the operation and its consequences; and in all, the growth was renewed within three months of the disappearance: a fallacious hope was in all excited, and bitterly disappointed. But I shall have presently to refer to a case in which the removal of cancers was independent of local injury.

It is most probable that fatty degeneration coincided with the wasting and absorption of cancer which occurred in the preceding cases; for it seems to be the most frequent change when growth is hindered. I have already referred to the fatty degeneration which, in medullary cancers, as in other tumours, may give an appearance of buff or ochre yellow lines or minute spots scattered, as a reticulum, through their substance. I have also described (p. 359) the similar but larger degeneration which ensues in those portions or lobes of medullary cancers, that are found as tuberculoid masses (phymatoid, of Lebert), yellow and half dry, among the other portions that appear actively progressive. In both cases it is probable that the altered substances are incapable of further growth; but the change, being only partial, does not materially affect the progress of the whole mass. But, though more rarely, a whole mass (especially when many exist, as in the liver), may be found white, or yellowish-white, soft, partially dried, close-textured but friable, and greasy to the touch,—in a state of what Rokitansky has called "saponification." In such cases, many of the cancer-cells and nuclei have the characters of the granular or fatty degeneration, and may appear collapsed and shrivelled; and they are mingled with abundant molecular matter and oil-particles of various sizes, and often with crystals of cholestearine or with colouring granules. All the analogies of such changes in other parts imply that cancers thus degenerated must be incapable of increase; they are amongst those which may well be called, as by Rokitansky, obsolete. But I am not yet sure that these gradual changes have been ever followed by absorption of the altered cancer-substance, and by healing:* the disease ceases but does not disappear: and usually, while one mass is thus changing, others are progressive.

* The supposed cases of healing of cancer of the liver, reported as having occurred at Prague, admit of other explanations. (See Lebert, Traité Pratique, p. 72.)

The calcareous degeneration is much more rare than the two preceding. It is fully described by Dr. Bennett* and Rokitansky,† and is in all essential characters similar to that which so often occurs in degenerating arteries, calcified inflammatory products, &c. The earthy matter, in minute granules, is commonly mingled with fatty matter, and, according to the quantity of fluid, is like more or less liquid or dry and hardened mortar: if hardened it lies in grains, or larger irregular concretions, in the substance of the tumour. Its indications are the same as those of the fatty degeneration with which it is usually mingled.‡

Among the diseases of medullary cancers their proneness to bleeding may be mentioned. Hence their occasionally abundant hæmorrhages when protruding, and the frequent large extravasations of blood in them, variously altering their aspects as it passes through its stages of decolorization, or other changes. The extreme examples of such bleeding cancers constitute the fungus hæmatodes.

Acute inflammation also is frequent, especially in such as are exposed through ulcers. It may produce not only enlargement of the blood-vessels and swelling of the tumour, but softening, suppuration, and, I believe, other of its ordinary effects. The softening may be compared with that which occurs in inflammation of any natural part, like which, also, it is, I believe, often attended with a rapid fatty

* On Cancerous and Cancroid Growths, p. 214.

† Loc. cit. p. 352.

‡ I have little doubt that the melanotic cancer might be truly described as a pigmental degeneration of the medullary cancer (except in the few instances in which epithelial cancers are melanotic). But part of another lecture will be devoted to this. The same lecture will comprise the colloid or alveolar cancer; and I shall have occasion to mention in it the frequent occurrence of cysts in medullary cancers, some of which might perhaps be described as a cystic disease of the cancers.

degeneration or a disintegration of the cancer-structures. I am not disposed to think with Rokitansky (p. 350), that the reticulum, or other ordinary yellow deposits in cancers, are due to inflammatory exudations passing into and propagating a fatty transformation; but I think that acute inflammation in a medullary or any other cancer is likely to be attended with the same degenerative softening and transformation, as we find constituting a part of the inflammatory process in the natural tissues. Thus degenerating, and whether with or without suppuration, a medullary cancer may be completely removed.

By sloughing, also, a medullary cancer may be wholly ejected; and this event is more likely to happen than with any other kind of cancer, because no other is common in the form of an isolable mass. I might collect several cases in which it has occurred, but none is more remarkable than this.* A strong man, 46 years old, under Mr. Lawrence's care, had a large firm medullary cancer deep seated in his thigh, of about nine months' growth, painful and increasing. In an attempt to remove it, the femoral artery was found passing right through it; its connections, also, appeared so wide and firm, and bleeding ensued from vessels of so great size, that the operation was discontinued after about half the surface of the tumour had been uncovered. The tumour sloughed, and gradually was completely separated. It came away with nearly three inches of the femoral artery and vein that ran through it. No bleeding occurred during or after the separation, and the cavity that remained in the thigh completely healed. The man regained an apparently good health for a few weeks;

* The case is fully reported by Mr. Abernethy Kingdon, in the Medical Gazette, 1850.

then the disease, returning in the thigh, proved quickly fatal.

In the following strange case nearly all the methods of spontaneous temporary cure which I have been illustrating were exemplified.

A tall, healthy-looking man, 36 years old, came under my care in July 1850. In October 1849, he thought he strained his shoulder in some exertion, and soon after this he noticed a swelling over his right deltoid muscle. It increased slowly and without pain for nine months, and was thought to be a fatty tumour, or perhaps a chronic abscess. About the beginning of July, other tumours appeared about the shoulder; and, when I first saw him, there was not only the tumour first formed, which now covered two-thirds of the deltoid, but around its borders were numerous smaller round and oval masses; in the axilla was a mass as large as an egg; over the brachial vessels lay a series of five smaller tumours, and a similar series of larger tumours over the axillary vessels reaching under the clavicle. A small tumour of several years' date lay at the border of the sterno-mastoid muscle; and one, which had been noticed for twelve years, was in the right groin. All these tumours were soft, pliant, painless, subcutaneous, moveable, more or less lobed. There could be very little doubt that they were medullary cancers, and their complete removal seemed impossible; but it was advised that, for proof's sake, one should be excised. I therefore removed one of those near the chief mass. It was composed of a soft greyish substance, with a pale purple tinge, lobed, easily reduced to pulp, and in microscopic structure consisted almost wholly of nucleated cells exactly conformed to the very type of cancer-cells. The operation was followed by no discomfort; and, a few days after it, the patient left the hospital, still looking healthy, but, I supposed, doomed to a rapidly fatal progress of the disease.

At home, near Dover, he was under the care of Mr. Sankey. In a few days after his return, the skin over the largest tumour cracked, and a thin discharge issued from it. Four days later he was attacked with sickness, diarrhœa, and abdominal pain, and in his writhings he hurt his arm. Next day, three or four more openings had formed over the great tumour, and the scar of the operation-wound reopened: the tumour itself had rapidly enlarged. From all these apertures pus was freely discharged, and in a day or two large sloughs were discharged or drawn through them. With the sloughing, profuse hæmorrhage several times occurred. All the upper part of the arm and shoulder was undermined by the sloughing, and a great cavity remained, from which, for three weeks, a thin fœtid fluid was discharged, but which then began to heal, and in twelve weeks was completely closed-in.

While these changes were going on in the tumours over the deltoid and in those near it, that in the axilla was constantly enlarging. It became "as large as a hat," and early in September it burst; and through a small aperture about six pints of pus were rapidly discharged. A great cavity, like that of a collapsed abscess, remained; but it quickly ceased to discharge, and healed. In the same time all the tumours over the brachial vessels disappeared; they did not inflame or seem to change their texture; only, they gradually decreased and cleared away, and with them that also disappeared which had been in the groin for twelve years.

It need hardly be said that during all this time of sloughing and suppuration the patient had been well managed, and amply supported with food and wine and medicine. About the end of October he appeared completely recovered, and returned to his work. I saw him again in January 1851. He looked and felt well, and, but that his arm was weak, he was fully capable of work as an agricultural labourer. Over the lower half of the deltoid there was a large irregular scar; and this appeared continuous posteriorly with a small mass of hard tough substance, of which one could not say whether it were tissues indurated after the sloughing, or the remains of the tumour shrivelled and hardened: whatever it was, it was painless and gradually decreasing. No trace remained of the other tumours in the arm, except a small mass like a lymphatic gland in the middle of the upper arm. In the axilla there was a small swelling like a cluster of natural lymphatic glands. The tumour also remained at the border of the sterno-mastoid muscle, and was rather larger than in July.

In February 1851, the swelling in the axilla began to increase; its growth became more and more rapid. By the end of March the arm was greatly swollen; he suffered severe pain in and about it; his health failed; he had dyspnœa and frequent vomiting, and died with pleuro-pneumonia on the 20th of April. The tumour in the axilla (the only one found after death) was about eight inches long, oval, lobed, soft, vascular, and brain-like, and consisted, chiefly, of small apparently imperfectly formed cancer-cells.

Such a case as this needs little comment. It illustrates the spontaneous removal, and, so far, the healing, of medullary cancers by absorption, by inflammation and abundant suppuration, and by sloughing. It shows the absorption of the cancerous matter, doubtless in an altered state, accomplished without evident injury to the economy. And it illustrates the cancerous diathesis quickly re-established after being, we must suppose, suspended or superseded, for a time, during the removal of its products. Hard, therefore, as, we may say, the struggle for recovery was, it was not successful.

It is scarcely possible to give general illustrations of the pain and other phenomena attendant on the progress of medullary cancers; for these are variously modified by the many organs in which it may have its primary seat. The history of some of the medullary cancers, which grow as distinct tumours, may teach us that the pain is not an affection of the cancer itself, but of the organ which it occupies. Such cancerous tumours, in the subcutaneous cellular tissue, are, I believe, rarely the sources of pain; often they are completely insensible: yet the same kind of tumours seated among the deeper parts of limbs, or enclosed in the testicle, or in bone, seem to be usually painful, and often severely so. The difference indicates that the varying pain is not of the cancer, but of the part it fills.

The cachexia is, in the later periods of the disease, too much varied by the disturbed functions of the organs specially affected to admit of general description. But it is chiefly in this form of cancer that, early in the disease, and even while the local affection seems trivial, and involves no important part, we often find the signs of the general health being profoundly affected; the weight and muscular power regularly diminishing, the complexion gradually fading, the features becoming sharper, the pulse and breathing quicker, the blood more pale. Such events are, indeed, inconstant, both in the time of their occurrence and in their intensity; but in many cases they are far too striking to be overlooked; the defective nutrition of the early stages of phthisis is not more marked: the evidence is complete for the proof of a distinct cancerous cachexia, which is indeed commonly indicated and may be measured by a cancerous growth, but which may exist in a degree, with which neither the bulk, nor the rate of increase, of the growth is at all commensurate.

To estimate the general duration of life in those who have medullary cancers, those cases alone should be reckoned in which parts whose functions are essential to life are affected;—such as the bones and soft parts about the trunk and limbs, the testicle, the eye, and other external organs. From a table of 50 cases of medullary cancers in these parts (including eight cases of cancer of the bones by M. Lebert), in all of which the disease pursued its course without operative interference, I find the average duration of life to be rather more than two years from the patient's first observation of the disease.*

Among 45 of these patients,—

6	died within	6	months
7	,, between	6 and 12	,,
11	,, ,,	12 and 18	,,
4	,, ,,	18 and 24	,,
7	,, ,,	24 and 36	,,
7	,, ,,	36 and 48	,,

3 ,, more than 48 months from the commencement of the disease.

A comparison of this table with that at p. 345 will show, in striking contrast with the history of scirrhous cancer, the rapidity of this form in running its fatal career; a rapidity which is certainly not to be ascribed to the earlier exhaustion produced by hæmorrhage, discharge, pain, or other local accidents of the disease, but is mainly due to

* I have not reckoned in this table the exceptional cases referred to at p. 394, in which the disease appears to be suspended for some years. But I have included five cases in which the patients were still living beyond the average time. In the 45 already dead, the average duration of life was 23·8 months.

the augmenting cachexia. The same comparison will show how small is the proportion of those in whom the disease lasts more than four years; and there seem to be no cases parallel with those of scirrhous cancer which are slowly progressive through periods of five, ten, or more years. I have mentioned instances of the apparent suspension of the disease; but these are different from the cases of constant slow progress, the rarity of which supplies an important fact in diagnosis, in the great probability that a tumour is not a medullary cancer, if it have been increasing for more than three years without distinct manifestation of its cancerous nature.

The effect of removing medullary cancers is, on the whole, an increased average duration of life; but chiefly, I believe, because in a few cases the operation is long survived, and in some, death, which would have speedily ensued, is for a time arrested. In the majority of cases the operation, if its own effects be recovered from, seems not to affect the average duration of life. Thus in 46 cases in which external medullary cancers were removed by excision, or amputation of the affected part, the average duration of life was something more than 28 months. Among 51 cases (including 9 cases of extirpated cancer of the eye, from M. Lebert) these were the several times of death, reckoning, as before, from the first observation of the disease by the patient:—

Within 6	months .	. 1
Between 6 and 12	,, .	. 13
,, 12 and 18	,, .	. 7
,, 18 and 24	,, .	. 8
,, 24 and 36	,, .	. 11
,, 36 and 48	,, .	. 3
Above 48	,, .	. 8

The comparison of this table with that in page 406 will show that the only notable contrast between them is in their first and last lines.

If the operation be recovered from, the regular course of events brings about the renewal of cancerous growth, either near the seat of the former growth, or in the lymphatics connected therewith, or, more rarely, in some distant part. In 38 cases of medullary cancer, affecting primarily the same external organs as afforded the cases for the former tables, I find the average period of recurrence after the operation to have been seven months. I have reckoned only those cases in which a period of apparent recovery was noted after the operation; all those cases are omitted in which the disease was not wholly removed, or in which it is most probable that the same disease existed unobserved in lymphatics or other internal organs at the time of operation. Yet the average rate of recurrence is fearfully rapid.

It was observed in between—

1 and 3	months in	18	cases
3 and 6	,,	11	,,
6 and 12	,,	4	,,
12 and 24	,,	3	,,
24 and 36	,,	2	,,

Among the 51 cases in the table on page 407, those of five patients are included, who are living, without apparent return of disease, for periods of 3, 3½, 4½, 5, and 6 years after operation; and I have referred already to one case in which a patient died with cancer in the pelvis twelve years after the removal of a testicle which was considered cancerous. Of cases more near to recovery than these I can find no instances on authentic record.

The cases I have been able to collect supply little that is conclusive respecting the different durations of life, according to the age of the patient, the seat of the cancer, and other such circumstances. In children under ten years old, the average duration of life, with medullary cancers of external parts, is, I believe, not more than eighteen months; after ten years, age seems to have little or no influence. According to the part affected the average duration of life appears to be greater in the following order:—the testicle, the eye, the bones, the soft parts of the limbs and trunk, the lymphatics; but the difference is not considerable. The average for the cancers of the testicle is about 23 months; that for the tumours in the limbs and trunk nearly 30 months. It is the same, I believe, with the results of operations; recurrence and death occur, on the whole, more tardily after amputations for medullary cancers of the bones and soft parts of the limbs, than after extirpations of the eye or testicle; but there are many obvious reasons why we cannot hence deduce more than a very unstable rule for practice. The previous duration of the disease seems, also, to have little influence on the time of recurrence after the operation: the only general rule seems to be, that the rapidity of recurrence corresponds with that of the progress of the primary disease.

Now, respecting the propriety of removing a medullary cancer in any single case, much that was said respecting the operation for scirrhous cancer of the breast might be repeated here. The hope of finally curing the disease by operation should not be entertained. Such an event may happen, but the chance of it is not greater than that of the disease being spontaneously cured or arrested; and the chance of any of these things is too slight to be weighed in the decision on any single case. The question, in each case, is whether life may be so prolonged, or its sufferings so diminished, as to justify the risk of the operation. In general, I think, the answer must be affirmative wherever the disease can be wholly removed, and the cachexia is not so manifest as to make it most probable that the operation will of itself prove fatal.

(1) The number of cases in which the patients survive the operation for a longer time than that in which, on the average, the disease runs its course, is sufficient to justify the hope of considerable advantage from the removal of the disease. On the other hand, the number of chronic cases of medullary cancer is so small, that no corresponding hope of a life being prolonged much beyond the average can be reasonably held, if the disease be left to run its own career.*

(2) The hope that the removal of the cancer will secure a considerable addition (two or more years, for example) to the length of life, will be more often disappointed than fulfilled. But, even when we do not entertain this hope, the operation may be justified by the belief that it will avert or postpone great suffering. The miseries attendant on the regular progress of a medullary cancer, in any external part, are hardly less than those of hard cancer of the breast; they are such, and in general so much greater than those of the recurrent disease, that, unless it is very probable that an operation will materially shorten life, its performance is warranted by the probability of its rendering the rest of life less burdensome.

(3) A motive for operation in cases of supposed medul-

* The difference here stated may seem opposed by the tables in the foregoing pages. I must therefore state that, at page 394, I have referred to all the cases of chronic or suspended medullary cancer that I have ever seen or heard of; but that the cases of operations survived for more than three years, mentioned at page 407, were not selected on this account, but occurred in the ordinary course of observation.

lary cancers may often be drawn from the uncertainty of the diagnosis. This is especially the case with those of the large bones, for the removal of which the peril of the necessary operation might seem too great for the probability of advantage to be derived from it. I have referred to cases of cartilaginous and myeloid tumours of bone (pp. 181, 215, 219) in which during life the diagnosis from medullary cancers was, I believe, impossible. In all such cases, and I am sure they are not very rare, the observance of a rule against the removal of tumours or of bones believed to be cancerous, would lead to a lamentable loss of life. All doubts respecting diagnosis are here to be reckoned in favour of operations.

LECTURE XII.

EPITHELIAL CANCER.

PART I.—ANATOMY.

Epithelial cancer has its primary seat, with very rare exceptions, in or just beneath some portion of skin or mucous membrane. Its most frequent locality is the lower lip, at or near the junction of the skin and mucous membrane; next in order of frequency it is found in the prepuce, scrotum (of chimney-sweeps), labia, nymphæ, and tongue: more rarely it occurs in very many parts,—as at the anus, in the interior of the cheek, the upper lip, the mucous membrane of the palate, the larynx, pharynx, and cardia, the neck and orifice of the uterus, the rectum and urinary bladder, the skin of the perineum, of the extremities, the face, head, and various parts of the trunk. In the rare instances of its occurrence, as a primary disease, in other than integumental parts, it has been found in the inguinal lymphatic glands (in a case which I shall relate), in bones,* and in the tissues forming the bases or walls of old ulcers.†

* Virchow, in the Würzburg Verhandlungen, i. 106.

† The primary seats of the cancer, in the cases from complete records of which the following descriptions are drawn, were as follows:—Lower lip, 9 cases; tongue, 9; scrotum, 6; face, 3; penis, 3; labia, 2; gum, 2; integument of the trunk, 2; of the upper extremity, 3; lower extremity, 2; ear, eyelids, interior of the cheek, neck, perineum, arms, larynx, inguinal lymphatic glands, each 1. With very few exceptions, these are cases in which the disease was removed by operation or examined after death: in all such cases the microscopic

By extension from any of its primary seats, an epithelial cancer may occupy any tissue: thus, in its progress from the lip, tongue, or any other part, muscles, bones, fibrous tissues, are alike invaded and destroyed by it. As a secondary disease, or in its recurrence after removal by operation, it may also have its seat in any of these tissues at or near its primary seat; but it more commonly affects the lymphatic glands that are in anatomical connection therewith; and, very rarely, it has been found in internal organs, the lungs, liver, and heart.*

The essential anatomical character of the epithelial cancer is, that it is chiefly composed of cells which bear a general resemblance to those of such tessellated or scaly epithelium as lines the interior of the lips and mouth,† and that part of these cells are inserted or infiltrated in the interstices of the proper structures of the skin or other affected tissue.‡

characters of the structure were observed. I may add that the account drawn chiefly from these cases is confirmed by the recollection of a much larger number which I have observed but have not recorded.

* In the lungs and in the heart, in the Museum of St. Bartholomew's. In the liver once, by Rokitansky (Pathol. Anat. i. 386). In the lungs and in the liver, in the Museums of Berlin and Würzburg (Virchow, l. c.; and in his Archiv, B. iii. p. 222).

† In very rare cases the cells, or part of them, are like those of columnar epithelium (see pp. 443, 450).

‡ In assigning these two conditions as the essential characters of epithelial cancers—namely, both the construction with epithelial cells and the insertion of such cells among the original, though often morbid, textures of the affected part, I make a group of diseases less comprehensive than either the "Cancroid" of Lebert and Bennett, or the "Epithelioma" of Hannover. These excellent pathologists, and many others following them, would abolish altogether the name of epithelial cancer, and place the cases which are here so designated in a group completely separate from cancers, as exemplified by the scir-

The epithelial cancers of the skin or mucous membrane from which, as types, the general characters of the disease must be drawn, present many varieties of external shape and relations, which are dependent, chiefly, on the situation in which the cancerous structures are placed. They may be either almost uniformly diffused among all the tissues of the skin or mucous membrane, predominating in only a small degree in the papillæ; or the papillæ may be their chief seat; or they may occupy only the sub-integumental tissues. As a general rule, in the first of these cases, the cancer is but little elevated above or imbedded below the normal level of the integument, and its depth or thickness is much less than its other dimensions; in the second, it forms a prominent warty or exuberant outgrowth; in the third, a deeper-seated flat or rounded mass. These varieties are commonly well marked in the first notice of the cancers, or during the earlier stages of their growth; later, they are less marked, because (especially after ulceration has commenced) an epithelial cancer, which has been superficial or exuberant, is prone to extend into deep-seated parts; or one which was at first deeply seated may grow out exuberantly. Moreover, when ulceration is in progress, a greater uniformity of external appearance is found; for, in general, while all that was superficial or exuberant is in process of destruction, the base of the cancer is constantly

rhous and medullary forms. It is not without much consideration that I have decided to differ from such authorities; but I believe that the whole pathology of the diseases in which the two characters above cited are combined is, with rare exceptions, so closely conformed to that of the scirrhous and medullary cancers, that they should be included under the same generic name. The grounds of this belief, which, I think, agrees with the opinions of Rokitansky and Virchow, will appear in the present lecture; and at its end I will briefly sum them up.

extending both widely and deeply into the subintegumental tissues.

I believe that it will be useful to describe separately the external characters of the two principal varieties of epithelial cancer of the integuments here indicated; and (while remembering that mingled, transitional, and intermediate specimens may be very often seen), to speak of them as the superficial or out-growing, and the deep-seated, forms of the disease.*

Among the examples of the superficial epithelial cancers, the greater part derive a peculiar character from the share which the papillæ of the skin or mucous membrane take in the disease. These being enlarged, and variously deformed and clustered, give a condylomatous appearance to the morbid structures, which has led to their being called papillary or warty cancers, and which renders it sometimes difficult to distinguish them from common warty growths. According to the changes in the papillæ, numerous varieties of external appearance may be presented: I shall here describe only the chief of them.

In the most ordinary examples of epithelial cancer of the lower lip, or of a labium, or of the scrotum in the soot-cancers, if they be examined previous to ulceration, one

* I believe that either of these forms may occur in any of the parts enumerated as the usual seats of epithelial cancer; but they are not both equally common in every such part. The superficial, and especially those which have the characters of warty and cauliflower-like outgrowths, are most frequently found on mucous surfaces, especially those of the genital organs; the deep-seated are more frequent in the tongue than elsewhere; those on the extremities and in the scrotum have usually a well-marked warty character, and are rarely deep-seated. Other particulars might, I believe, be stated, but I am unwilling to state them unsupported by counted numbers of cases.

can feel an outspread swelling, and an unnatural firmness or hardness of the affected skin. The width and length of the swelling are much greater than its thickness. The diseased part is enlarged; the lip, for example, pouts, and projects like one overgrown; and the swelling is slightly elevated, rising gradually or abruptly from its borders, and having a round or oval or sinuous outline. Its surface, previous to ulceration, may be nearly smooth, but more often is coarsely granulated, or tuberculated, or lowly warty, like the surface of a syphilitic condyloma, deriving this character usually from the enlarged and closely clustered papillæ. The surface is, generally, moist with ichorous discharge, or covered with a scab, or with a soft material formed of detached epidermal scales. The firmness or hardness of the diseased part is various in degree in different instances: it is very seldom extreme; the part, however firm, is usually flexible and pliant, and feels moderately tense and resilient on pressure. Commonly, it is morbidly sensitive, and the seat of increased afflux of blood. Its extent is, of course, various; but, before ulceration, the disease makes more progress in length and breadth than in depth; so that when, for example, it occupies the whole border of a lip or of a labium, it may not exceed the third of an inch in thickness.

In the form of epithelial cancer just described there may be no considerable enlargement of papillæ, or it may only appear when the growth is cut through. But, in many instances (especially, I think, in the epithelial cancers of the prepuce, glans, and integuments of the extremities), the changes of the papillæ are much more evident. In some, as in the adjacent sketch, one sees a great extent of surface covered with crowds and clusters of enlarged papillæ set on a level or slightly elevated portion of the cutis. Singly, (when the ichor and loose scales that fill their intervals are washed away) they appear cylindriform, flask-shaped, pyriform, or conical: clustered, they make nodulated and narrow-stemmed masses. They may be in one or in many groups; or groups of them may be scattered round some large central ulcer. They appear very vascular, and their surface, thinly covered with opaque white cuticle, has a pink, or vermilion, or brightly florid hue.†

FIG. 55.*

In other instances, or in other parts, a large mass is formed, the surface of which, when exposed by washing away the loose epidermoid cells which fill-up its inequalities, is largely granulated or tuberculated, and is planned-out into lobes by deeper clefts. Such growths are up-raised, cauliflower-like; and, with this likeness, may be broken through the clefts, into narrow-stemmed masses, formed each of one or more close-packed groups of enlarged, tube-

* The papillary character is well shown in the specimen of soot-cancer of the hand, in the Museum of St. Bartholomew's (Ser. xi. 6), which is represented in fig. 55. The history of the case is in Pott's Works by Earle, iii. 182. The patient was a gardener, who had been employed in strewing soot for several mornings: the disease was of five years' duration.

† Museum of St. Bartholomew's, Ser. i. 42, 126, 127, &c., and Ser. xi. 6. Mus. Coll. Surg. 2301, 2607, 2608, &c.

rous, and clavate papillæ.* The surface of such a growth shows, usually, its full vascularity; for if it be washed, it appears bare, and, like the surface of common granulations, has no covering layer of cuticle. It may be florid, bleeding on slight contact, but, more often, it presents a dull or rusty vermilion tint, rather than the brighter crimson or pink of common granulations, or of such warts as one commonly sees on the prepuce or glans penis.

Occasionally we meet with an epithelial cancer having the shape of a sharply-bordered circular or oval disk, upraised from one to three lines above the level of the adjacent skin or mucous membrane, and imbedded in about the same depth below it. The surfaces of such disk-shaped cancers are usually flat, or slightly concave, granulated, spongy, or irregularly cleft; their margins are bordered by the healthy integuments, raised and often slightly everted by their growth. Such shapes are not unfrequent among the epithelial cancers of the tongue, of the lining of the prepuce, and of the scrotum. I removed such an one, also, from the perineum, and have seen one in the vagina.

Sometimes, again, an epithelial cancer grows out in the form of a cone. I examined such an one removed from the lower lip, which was half an inch high, and nearly as much in diameter at its base. Its base was a cancerous portion of cutis; its substance was firm, grey, composed of the usual elements of epithelial cancers imbedded among fibro-cellular and elastic tissue outgrown from the skin: the subcutaneous tissue was healthy. In another instance an exactly similar cancer grew on a chimney-sweep's neck;† and in both these cases, the growth, being covered with a

* Museum of St. Bartholomew's, Ser. xxx. 35. Mus. Coll. Surg. 2609.

† Mus. of St. Bartholomew's. In the next year the same patient was in the hospital with a cancerous wart of the scrotum.

thick laminated black and brown scab, was, at first, not easy to distinguish from syphilitic rupia: that in the neck might even have been confounded (as some, I believe, have been) with one of the *horns* that grow from diseased hair follicles. Mr. Curling* describes a similar growth, three-quarters of an inch long, on the scrotum of a chimney-sweep; and has copied, from one of Mr. Wadd's sketches, a representation of a horn 2½ inches long similarly formed.

FIG. 56.†

Lastly, we may find epithelial cancers as narrow-stemmed or even pendulous growths from the cutis. I have seen such on the lower lip, and at the anus, like masses of very firm exuberant granulations, two inches in diameter, springing from narrow bases in the cutis or deeper tissues, and far overhanging the adjacent healthy skin. And I lately examined one of this kind, which was removed from the skin over the lower border of the great pectoral muscle. It was exactly like the specimen sketched in fig. 56. It was spheroidal, about an inch in diameter, rising from the skin with a base about half as wide; it was lobed, deeply fissured, and subdivided like a wart, with its component portions pyriform and mutually compressed. Its surface

* Treatise on Diseases of the Testicle, p. 522. The specimen is in the Mus. Coll. Surg., 2469. In the Museum of St. Bartholomew's is an instance of very large soot-cancer, in which, at the borders of the ulcer, there are spur-shaped sharp-pointed processes, doubtless cancerous papillæ, some of which are from ¼ to ½ an inch in length.

† Fig. 56. Section of a narrow-based out-growing epithelial cancer. It was extremely vascular, and had grown in the place of a dark mole, or pigmentary nævus, on the wall of the abdomen. Two growths had been previously removed from the same part.

was pinkish, covered with a thin opaque-white cuticle, which extended into and seemed to cease gradually in the fissures. Its substance, composed almost wholly of epithelial cancer-cells, was moderately firm and elastic. It was but little painful. A thin, strong-smelling fluid oozed from it. The patient had noticed a small unchanging wart in the place of this growth for ten or twelve years. Without evident cause it had begun to grow rapidly, and had become redder and discharged fluid, six weeks before its removal.*

It is almost needless to say that a much greater variety of shapes than I have here described may be derived from the different methods and degrees in which the papillæ are deformed, enlarged, and involved in the cancerous disease. All, and more than all, the shapes of common warty and condylomatous growths may be produced. But the same general plan of construction exists in all; namely, a certain portion of the skin or mucous membrane is infiltrated with epithelial cancer-structures: on this, as on a base more or less elevated and imbedded, the papillæ, variously changed in shape, size, and grouping, are also cancerous; their natural structures, if we except their blood-vessels, which appear enlarged, are replaced by epithelial cancer-cells. And herein is the essential distinction between a simple or common warty or papillary growth, and a cancerous one or warty cancer. In the former the papillæ retain their natural structures; however much they may be multiplied, or changed in shape and size, they are either merely hypertrophied, or are infiltrated with organized in-

* The cauliflower excrescence of the uterus may be most nearly compared with the extremely exuberant epithelial cancers such as are described above (see p. 450).

flammatory products; however abundant the epidermis or epithelium may be, it only covers and ensheathes them. But in the warty cancer the papillæ are themselves cancerous: more or less of their natural shape, or of the manner of their increase, may be traced; but their natural structures are replaced by cancer-structures; the cells like those of epithelium lie not only over, but within, them.*

To describe the interior structure of the superficial cancerous growths, we may take as types the most common examples of cancers of the lower lip—those in which the papillæ are indeed involved, enlarged, and cancerous, but not so as to form distinct or very prominent outgrowths.

The surface of a vertical section through such a cancer commonly presents, at its upper border, either a crust or scab, formed of ichor, detached scales, and blood; or else a layer of detached epidermoid scales, forming a white,

* I described the papillary origin and construction of these cancers in 1838 (Medical Gazette, xxiii. 284), but was not then aware of their minute structure. Later examinations have made me sure that the true distinction between them and other papillary growths is as above stated. But it is to be observed that cancerous growths may appear papillary or warty, though no original papillæ are engaged in their formation. Thus when papillary cancers are deeply ulcerated at their centres, the base of the ulcer, where all the original papillæ are destroyed, may be warty, like its borders where the cancerous papillæ are evident. Some of the most warty-looking epithelial cancers are those which grow from the deep tissues of the leg after old injuries. This may be only an example of cancerous growths imitating the construction of adjacent parts; but in some instances (as in cysts, and on the mucous membrane of the gall-bladder and stomach), the warty cancers are probably examples of the dendritic mode of growth. It must also be a question, at present, whether some of the most exuberant cancers of the skin are not to be ascribed to this mode of growth. It is, to say the least, extremely difficult to trace their origin from once-natural papillæ.

crumbling, pasty substance. This layer may be imperceptible, or extremely thin; but it may be a line or more in thickness, and it enters all the inequalities of the surface on which it lies. Its cells or scales are not regularly tessellated or imbricated, like those of the epidermis on a common wart, but are placed without order, loosely connected both with one another and with the subjacent vascular structures, and may be easily washed away.

Such a layer must be regarded, I presume, as formed of epithelial cancer-cells, detached or desquamated from the subjacent vascular and more perfectly organized substance of the cancer. This substance presents, in most cases or in most parts, a greyish or greyish-white colour, and shines without being translucent. It is firm and resilient, close-textured, and usually void of any appearance of regularly lobed, granular, or fibrous construction, except such as may exist near its surface, where close-set and uniformly elongated vertical papillæ may make it look striped. The greyness and firmness are, I think, the more uniform and decided the slower the growth of the cancer has been. In the acute cases, especially of secondary formations, or when the cancer has been inflamed, or ulceration is in quick progress, the cut surface may be opaque white, or of some dull yellow or ochre tint, streaked and blotched with blood; or it may, in similar cases, be soft and shreddy, or nearly brain-like; but these appearances are very rare.

The grey substance of epithelial cancers commonly yields to pressure only a small quantity of turbid yellowish or greyish fluid: but with rare exceptions, one may squeeze or scrape from certain parts of the cut surface, as if from small cavities or canals, a peculiar opaque-white or yellowish-material. It is like the comedones, or accumulated epithelial and sebaceous contents of hair-follicles; or even more like what one may scrape from the epidermis of the palm or sole after long maceration or putrefaction. This material, which is composed of structures essentially similar to those of the firmer substance of the cancer, but differently aggregated, supplies one of the best characteristics of the disease. It may be thickly liquid, but more often is like a soft, half-dry, crumbling, curdy substance: pressed on a smooth surface, it does not become pulpy or creamy, but smears the surface, as if it were greasy: mixed with water, it does not at once diffuse itself, so as to make the water uniformly turbid, but divides into minute visible particles.*

The quantity of this softer material is extremely various in different instances of epithelial cancer. According to its abundance and arrangement, the grey basis-substance may appear differently variegated; and the more abundant it is the more does the cancer lose firmness, and acquire a soft, friable, and crumbling texture. In many cases the soft substance appears, on the cut surface, like imbedded scattered dots, or small grains: these being sections of portions contained in small cavities. But, as the quantity increases, and the cavities containing it augment and coalesce, so the firmer substance becomes, as it were, cribriform; or when the softer substance is washed away, it may appear reticulated or sponge-like, or as if it had a radiated or plaited structure. Or, lastly, the soft substance may alone compose the whole of the cancer: but this, I

* In these are its distinctions from the "juice" of either scirrhous or medullary cancers. But it must be remembered that, in the rare instances in which epithelial cancers are very soft, they may yield a creamy or turbid greyish fluid. It can hardly be necessary to give a caution against confounding the peculiar material described above with that which may be pressed from milk-ducts involved in scirrhous cancers (compare p. 301).

think, is very rarely the case, except in secondary formations and in the lymphatic glands.

Vertical sections of the more exuberant and the more distinctly papillary epithelial cancers present essentially the same appearance as I have just described. The upper border, corresponding with the exposed part of the growth, may be overlaid with thin scab, or crust, or epidermoid scales, detached and disorderly, or may be bare, like that of a section of common granulations. The cut surface is generally grey, succulent, and shining, with distinct appearances of vascularity. Portions of it may yield the peculiar soft crumbling substance like macerated epidermis; but this is, I think, generally less abundant than in the less exuberant and deeper-set specimens, and is more often arranged in a radiated or plaited manner.

The vertical sections of the superficial epithelial cancers of the integuments display many important differences, in relation to the depth to which the cancer-structures occupy the proper tissues of the skin or mucous membrane.

In some, only the papillæ, or the papillæ and the very surface of the tissue on which they rest, appear to be involved. The enlarged papillæ, in such cases, usually retaining their direction and their cylindrical or slenderly-conical shape, appear like fine grey stripes or processes vertically raised on the healthy white tissue of the integument, or on its surface rendered similarly grey by cancerous infiltration. And the outlines of the papillæ are commonly the more marked because of their contrast with the opaque white substance formed by the epidermoid scales which cover them and fill up all the interstices between them. In such cases, the cancerous material may be more abundant on the surface than in the substance of the papillæ or corium; and often the whole morbid substance is brittle, and may be separated from the corium which bears the papillæ.

But more frequently, and almost always in such cases of epithelial cancers when they are removed in operations, the cancerous structures are more deeply set. They occupy the whole thickness of the integument, or reach to a level deeper than it. The base or lower border of the diseased mass rests on, or is mingled with, the subcutaneous or submucous tissues, whatever these may be,—fat, muscular fibres, or any other. The lateral borders usually extend outwards for some distance, on each side, beneath the healthy integument which bounds the upraised part of the diseased growth, and which is usually raised and everted so as to overhang the adjacent surface. In nearly all these, also, while the surface and central parts of the cancer are being destroyed by ulceration, its base and borders are, at a greater rate, extending more deeply and widely in the subcutaneous or submucous tissues.

The bases of the most exuberant and most distinctly papillary cancers are rarely, in the early periods of their growth, either deeply or widely set in the integument. They rarely, I believe, occupy more than the thickness of the portion of the skin or mucous membrane from which the growths spring: they sometimes occupy less. But, in their later growth, and especially when ulceration is progressive, the same deeper and wider extension of the base of the cancer ensues as I mentioned in the last paragraph.

All the foregoing description will have implied that the proper structures of the diseased parts are mixed-up with the cancer-structures inserted among them: the condition of parts is here exactly comparable with that of other cancerous infiltrations. (Compare p. 294 and 304.) The boundaries of the cancer, as seen in sections, usually appear to the naked eye well-defined; yet it is often easy to see portions of the natural tissues extending into it, these being continuous with those portions among which the cancer-structures are infiltrated. This is especially evident when, as in the lip or tongue, the superficial muscular fibres are involved. Pale red bands may then be traced into or within the cancer; and the microscope will prove, if need be, their muscular structure. Or, when these cannot be traced, yet we may find the fibro-cellular and elastic fibres of the involved skin or mucous membrane.

Concerning the changes that ensue in the tissues thus involved in the deeper parts of epithelial cancers, I believe that what was said of those in cancerous breasts (p. 294 and 304) might be here nearly repeated, regard being had to the original differences of the tissues in the respective cases. In general, the natural structures in these cases appear not to grow; gradually, but not all at the same rate, they degenerate and are removed, till their place is completely occupied by the increasing cancer-structures, and an entire substitution is accomplished. So, too, what was said of the stroma of scirrhous cancers of the breast might be repeated. These epithelial cancers have no stroma of their own; their proper structures are sustained by the remains of the original textures of the affected part. And, as in the scirrhous cancers, so in these; when they grow very quickly, they occupy a comparatively small area of the original tissues, and may appear like nearly distinct tumours.

In the most exuberant epithelial cancers, and in those that are prominent, like warts or condylomata, there is more growth of the natural tissues; those, not of the papillæ alone, but of the basis of the skin or mucous membrane, may be traced into the outgrowth, forming a stroma for the cancer-structures, and surmounted by the cancerous papillæ. Such a stroma may be well traced in many soot-cancer-warts: the fibro-cellular and elastic tissues extend from the level of the cutis, in vertical or radiating and connected processes among which the cancer-cells lie; and one may compare them with the osseous outgrowths that form an internal skeleton of a cancer on a bone (see p. 363).

The tissues bordering on the superficial epithelial cancers appear generally healthy, but they are often increased in vascularity, and succulent. The adjacent corium also may appear thickened, with its papillæ enlarged, and an unusual quantity of moist opaque-white cuticle may cover them.* This condition is, however, not frequent; neither is it peculiar to the environs of cancer; changes essentially similar are often observed around chronic simple ulcers of the integuments.†

The deep-seated epithelial cancers remain to be described. In the progress of all the preceding varieties of the superficial form of the disease, especially when their surfaces are ulcerating, we may trace a constant subintegumental extension of their bases, in both width and depth; an extension which is more than commensurate with the destruction at the surface, and in the course of which no tissue is spared. Now, the same cancerous infiltration of the subcutaneous or submucous tissues, which is thus the common result of the extension of the disease from the surface, may also occur primarily: that is, the first formation of epithelial cancers may be in masses of circumscribed infiltration of the tissues beneath healthy skin or mucous membrane.

* M. Lebert (Traité pratique, p. 618) quotes from M. Follin, that the tissues around the disease are often "infiltrated with epidermis in a diffuse manner."

† On some of the diseases of the papillæ of the cutis (Medical Gazette, vol. xxiii. p. 285). The multiform appearances of epithelial cancers which I have described may be still more varied by the consequences of degeneration and disease. But it would be too tedious to describe them minutely, while, as I believe, they are essentially similar to the consequences of the same affections in the scirrhous and medullary cancers, of which I have already given some account.

The same condition is more frequent in the epithelial cancers that form, as recurrences of the disease, near the seats of former operations, or, as secondary deposits, about the borders of primary superficial growths.

In comparison with the superficial form, the primary deep-seated epithelial cancer is a very rare disease; yet it is frequent enough for me to have seen, within the last year, three cases, which I will describe; for they were all well marked-examples.

A chimney-sweep, 32 years old, died suddenly, suffocated, in the night after his admission into St. Bartholomew's.

He had had cough for six months, and aphonia and dyspnœa for two months. A scrotal soot-cancer had been removed from his brother in the previous year.

I found a wide-spread layer of firm substance, exactly like that of the majority of epithelial cancers, under the mucous membrane of the larynx, involving the left border of the epiglottis, the left arytenoid cartilage, the intervening aryteno-epiglottidean fold, part of the right arytenoid cartilage, and the upper and posterior third of the left ala of the thyroid cartilage. In all this extent, the diseased substance lay beneath the mucous membrane, which, though very thinly stretched over some parts of it, appeared healthy, was covered with ciliary epithelium wherever I examined it, and could everywhere be separated in a distinct layer.* All the submucous tissues were involved; the cartilages, as it were buried in the growth, appeared less changed than the softer parts. The surface of the growth, as covered with the mucous membrane, was lowly lobed, or tuberculated, raised from one to two lines above the natural level; its border was in many parts sinuous. The

* The specimen, and those referred to in the two following cases, are in the Museum of St. Bartholomew's.

cancerous substance was firm, elastic, compact, greyish and white, shining, variously marked on its section with opaque-white lines. It appeared wholly composed of the usual minute structures of epithelial cancers, including abundant laminated epithelial capsules. All the epithelial structures were of the scale-like form, though collected in the tissues under a membrane covered with ciliary epithelium.

Fig. 57.

A man was admitted into the Hospital, in a dying state, with a large firm swelling between the lower jaw and the hyoid bone, the increase of which had produced great difficulty of breathing and swallowing. After his death, the greater part of the swelling was found to be due to cancer of the deep tissues of the tongue, and of the fauces and lymphatic glands. A section of the parts (as in fig. 57) showed that the muscular and other structures of the posterior two-thirds of the tongue were completely occupied by a firm cancerous infiltration: but the mucous membrane of the tongue was entire; its various papillary structures only were healthy and distinct; it was tight-stretched and adherent on the surface of the cancer. From the base of the tongue the cancer extended backwards and downwards on both sides of the fauces, and as far as the vocal cords, preserving in its whole extent the characters of a massive infiltration of all the submucous tissues. It was covered with healthy-looking mucous membrane in every part, except just above the right vocal cord, where it protruded slightly through a circular ulcer less than half an inch in diameter. The substance of the disease presented, to the assisted as well as to the unaided sight, and touch, the well-marked characters of epithelial cancers. The lymphatic glands were similarly diseased.

A gentleman, 64 years old, had, on the upper part and right side of his nose, a flat, lowly-lobed or tuberculated growth, an inch in diameter, gradually rising above the level of of the adjacent skin to a height of 1½ or 2 lines. It was covered with skin, which was very thin and adherent, and florid with small dilated blood-vessels, like those in the skin of his cheek. The base of the growth rested on the bones; it felt like an infiltration of all the thickness of the deeper part of the skin and subcutaneous tissues, and moved as one broad and thick layer of morbid substance inserted in the skin. In its middle and most prominent part was a fissure nearly a line in depth, with black, dry borders, from which a very slight discharge issued. It was very painful, and, beginning from no evident cause, had been ten weeks in regular progress.

I removed this disease, and found in its centre a small, roundish mass of soft, dark, grumous substance, like the contents of a sebaceous cyst.* Around the cavity in which this was contained, all the rest of the disease appeared as an outspread infiltration of firm yellowish and white cancerous substance in the tissues under the stretched and adherent but entire skin. It extended as deep as the periosteum of the nasal bones. Soft, crumbling, and grumous substance could be scraped from it; and it yielded well-marked elements of epithelial cancer, with

* Mr. Hester and Mr. Rye, who saw this case some weeks before I did, told me that it presented, at first, all the characters of a common sebaceous cyst; and I think it quite probable that it was an example of epithelial cancer formed in and around such a cyst.

numerous laminated capsules. During the healing of the operation-wound, a similar small growth appeared in the adjacent tissue. It was destroyed with caustic by Mr. Hester, and the patient has remained well: but only a few months have yet elapsed.

Besides cases such as these, which may suffice for a general description of the disease, many might be cited, of what may be regarded as an intermediate form, in which both the skin or mucous membrane and the subjacent tissues are simultaneously affected, but the latter to a much larger extent than the former. Such cases are far from rare in the lower lip and tongue. They are characterized by the existence of a roundish, firm, or hard and elastic lump, deep-set in the part, well-defined to the touch, with its surface little, if at all, raised, and having at some part of its surface either a portion of cancerous integument, or a small ulcer or fissure.

Now these cases of deep-seated epithelial cancers have much interest, as well in practice as in their bearing on the pathology of the disease. They are instances of the disease of which it is impossible to speak as of mere augmentations of the natural structures; there is in them no trace at all of the assumed homology of epithelial growths; there is in them no progressive formation of epithelial cells gradually penetrating from the surface into the substance of the cutis; their progress, or a part of it, is from the deeper parts towards the surface.

The epithelial cancers in or near the integuments are so prone to ulceration, that the occasions of seeing them as mere growths are comparatively rare. The state in which they are usually shown to us is that of progressive ulceration of the central and superficial parts, with more than equal growth of the bordering and deeper parts. In this state, indeed, they present the type of that which is commonly described as the cancerous ulcer; a type which is observed, also, in some examples of the scirrhous cancer (p. 334), and more rarely in the medullary.

In the superficial first-described form of the disease, the ulceration usually begins either as a diffuse excoriation of the surface of the cancer, the borders of which are alone left entire, or else as a shallow ulcer extending from some fissure or loss of substance at which the disease commenced. The discharge from the excoriated or ulcerated surface usually concretes into a scab, or a thicker dark crust, beneath which, as well as beyond its edges, ulceration gradually extends in width and depth.

A nearly similar method is observed, I believe, in the earliest ulceration of the papillary and other more exuberant epithelial cancers. The central parts ulcerate first, and the ulcer from this beginning deepens and widens, destroying more and more of the cancer-structures; but its rate of destruction is never so quick as that of the increase of the borders and base of the cancer.

In the deep-seated epithelial cancers, other methods are observed in the first ulceration. Sometimes the skin or mucous membrane over them, becoming adherent and very thin, cracks, as it may when adherent over a scirrhous cancer (p. 333). Such a crack may remain long with little or no increase, dry and dark, and scarcely discharging; but it is usually the beginning of ulceration, which extends into the mass of the cancer. In other cases, with inflammation of the cancer, its central parts may soften and perhaps suppurate; and then its liquid contents being discharged (sometimes with sloughs), through an ulcerated opening, or a long fissure, a central cavity remains, from the uneven walls of which ulceration may extend in every direction. And again, in other cases, especially, I think, in secondary formations, and in those under the scars of old injuries, the cancer protrudes through a sharply-bounded ulcer in the sound integument or scar, and grows exuberantly, with a soft, shreddy surface, like a medullary cancer, or with a firmer, warty or fungous mass of granulations.

But though the beginnings of the ulcers be thus, in different instances, various, yet in their progress they tend to uniformity. The complete ulcer is excavated more or less deeply, and usually of round, or oval, or elongated shape. Its base and borders are hard, or very firm, because, as one may see in a section through it, they are formed by cancerous substance infiltrated in the tissues bounding it. The thickness of this infiltration is commonly, in direct proportion to the extent of the ulcer, from a line to half an inch or more: we may feel it as a distinct and well-defined indurated boundary of the whole ulcer, hindering its movement on the deeper tissues. The surface of the base of the ulcer is usually concave, unequal, coarsely granulated, nodular, or warty: it is florid, or, often, of a dull vermilion, or rusty red colour; it bleeds readily, but not profusely; and yields a thin ichorous fluid, which is apt to form scabs, and has a peculiarly strong, offensive odour, something like that of the most offensive cutaneous exhalations. The borders of the ulcer, or some parts of them, are, generally, elevated, sinuous, tuberous, or nodulated; frequently, they are everted and, to a less extent, undermined. They derive these characters, chiefly, from the cancerous formations beneath the skin or mucous membrane that surrounds the ulcer. These formations may be in a nearly regular layer, making the border of the ulcer like a smoothly rounded embankment; but oftener, though continuous all round the ulcer, they are unequal or nodular, and then corresponding nodules or bosses, from a line to nearly an inch high, may be raised-up round the ulcer, or some part of it. Moreover, these upraised borders may so project as to overhang both the base of the ulcer and the adjacent healthy surface of the skin or mucous membrane; they thus appear, at once, undermined and everted. When they are everted, healthy skin is usually reflected under them, and continued beneath them to their extreme boundary. When the papillary character of the primary growth was well marked, the borders of the ulcer often present, instead of the characters just described, a corresponding papillary or warty structure: for in these cases, the cancer continues apt to affect especially the papillæ, and widening areas of them become its seat as it extends. And, even at the base of the very deep ulcers, the cancerous granulations, though rising from the tissues far deeper than papillæ, may have a similarly warty construction.

The characters of the ulcer here described, are generally retained, however deep, and into whatever tissues, the cancer may extend. For the proper tissues of the successively invaded parts, at first infiltrated with cancer-structures, seem to be quickly disparted and then removed: even the bones rarely produce any outgrowths corresponding with those that are found in medullary cancers; they become soft, are broken up, and at length utterly destroyed. Epithelial cancers thus extending produced the changes described, as characteristic of malignant ulceration, in p. 16; and by similar extension (especially in the affections of the lymphatic glands), they lay-open great blood-vessels more often than any other ulcers do. I have seen three cases in which the femoral artery was thus opened by ulceration extending from the epithelial-cancerous inguinal glands.

The minute component structures of the epithelial cancers are alike among all the varieties of construction and external shape that I have now described; and, if we omit the proper textures of the part affected, they may be thus enumerated: (*a*) epithelial cancer-cells; (*b*) nuclei, either free, or imbedded in blastema; (*c*) endogenous or brood-cells; (*d*) laminated epithelial capsules, or epithelial globes. From each of these, by degeneration or other change, several apparently different forms may be derived. The proportions, also, in which they are combined are various in different specimens; but I believe that diversities of appearances to the naked eye are not so connected with these proportions, as with the methods of arrangement, the degrees of degeneration of the component structures, and the mingling of the products of inflammation in the cancer.

(*a*) The most frequent cells (fig. 58, A), and those which may be regarded as types, are nucleated, flattened, thin and scale-like. They are, generally, round or round-oval; but they seldom have a regular shape: their outline is, usually, at some part, linear, or angular, or extended in a process. Their average chief diameter is about $\frac{1}{700}$ of an inch; but they range from $\frac{1}{200}$ to $\frac{1}{1200}$, or perhaps beyond these limits. In the clear, or very palely nebulous cell-contents, a few minute granules usually appear, either uniformly scattered, or clustered, as in an areola, round the nucleus.

The nucleus is usually single, central, and very small in comparison with the cell, rarely measuring more than $\frac{1}{3500}$ of an inch in its longest diameter: it is round or oval, well-defined, subject to no such varieties of shape and size as the cell. It is usually clear and bright, and is often surrounded by a narrow, clear area; it may contain two or more minute granules, but rarely has a bright, distinct nucleolus.

But many of the cells may deviate widely from these characters, the most various and (if the term may be used)

FIG. 58.*

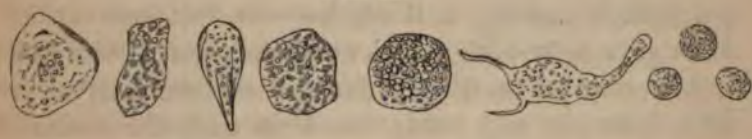
fantastic shapes may be found mingled together. The younger cells are generally smaller, rounder, more regular, less flattened to the scale-like form, clearer, and with comparatively larger nuclei. The older (as I suppose) appear drier and more filmy; they are often void of nuclei, and like bits of membrane in the shape of epithelial scales (B): they are flimsy, too, so that they are very often wrinkled or folded and rolled up, so as to look fibrous (C). Independently of differences of age, some cells are prolonged in one, two, or more slender or branching processes; some are very elongated (as D); some are void of nuclei; some, within their pale borders, present one or two dimly-marked concentric rings, as if they had laminated walls.

To these varieties may be added such as depend on the progressive degeneration of the cells. The most frequent (besides the withering which, I suppose, is shown in the shrivelled, flimsy scales without nuclei, just mentioned) is the change like fatty degeneration in other cancer-structures. One of the most frequent effects of such degeneration is that the place of the nucleus is occupied by a circular or

* Various epithelial cancer-cells or scales. Magnified 350 times: referred to in the text.

oval group of minute oily-looking molecules, some bright with black borders, some dark (fig. 59). Others, like these, or larger, are generally scattered through the cell. With the progress of the degeneration, all trace of the nucleus is lost; the molecules increase in number and in size, till the whole cell or scale appears filled with them, or is transformed into an irregular mass of oily-looking particles, differing in shape alone from the common granule-masses of fatty degenerations.

FIG. 59.*



(*b*) Nuclei either free or imbedded in a dimly molecular or granular basis, are commonly found mingled with the cells. I believe they occur in the greatest abundance in the most acute cases. They may be just like the nuclei of the cells; but, usually, among those that are free, many are larger than those in the cells; and these, reaching a diameter of more than $\frac{1}{3000}$ of an inch, at the same time that they appear more vesicular and have larger and brighter nucleoli, approximate very closely to the characters of the nuclei of scirrhous and medullary cancer-cells. Indeed, I have seen many nuclei in soot-cancers, which, if they had been alone, I could not have distinguished from such as are described at page 299: yet all the other structures of these specimens were those usual in epithelial cancers, and between the different characters of nuclei there were all

* Cells and free nuclei of epithelial cancer, in states of fatty degeneration. Magnified 350 times.

possible gradations. The free nuclei, like the cells, may be found in all stages of degeneration (fig. 59).

(*c*) Those which are named brood-cells, or endogenous cells, present many varieties of appearance, which may be regarded as the results of one or more nuclei, enclosed within cells, assuming, or tending to assume, the characters of nucleated cells (fig. 60).* In some cells a nucleus appears very large, clear, pellucid, spherical: it loses, at the same time, its sharply-defined outline, its boundary becomes shadowed, and it looks like a hole or vacant space in the cell (A). Thus enlarging, the nucleus may nearly fill the cell, and appear as a pellucid vesicle. I think, however, that such nuclei rarely grow to be cysts, like those whose history is described in the second lecture (p. 30); for cysts containing serous or other fluids are very rarely found in epithelial cancers. Neither have I seen instances of free nuclei changed, as those in the cells are.†

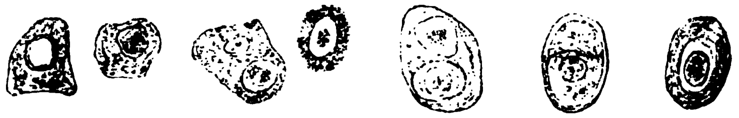
The enlarged nucleus may remain completely pellucid or barren; but often granular matter appears to fill it; and, as often, one or two corpuscles form in it, which now appear as its nuclei, and make it assume the character of a cell, endogenous within the first or parent-cell (B). The sketches show many of the appearances

* We owe the ability to interpret these appearances, which illustrate many things interesting in the general physiology of cells, almost entirely to Virchow (in his Archiv, iii. 197) and Rokitansky, l. c. Other facts, derived from the examination of solid tumours, and illustrating the capacity of the nucleus for development, are in pages 178, 224, 369: all these may deserve study in physiology, together with the doctrine of cyst-formation explained at p. 30, &c.

† Virchow, however (Würzburg Verhandl. i. 100), mentions having found, in a cauliflower excrescence of the uterus, alveoli which, after the plan of proliferous cysts, contained secondary papillary growths. The analogy of other proliferous cysts may indicate that these also originated in nuclei.

that may be hence derived; and others may be thus explained. When a cell contains two nuclei, one only

FIG. 60*.



A B C D

of these may enlarge or become inflated (if I may use such a term for that which fills with liquid, not with air); the other may be then pressed against the wall of the cell. Or both nuclei may alike proceed to the grade of cells, and two cells, flattened at their place of mutual compression, appear within the parent-cell (C): or a secondary nucleus, *i. e.* one formed within an enlarged nucleus, may enlarge like its predecessor, and become like a pellucid cavity, or may become a secondary cell, and contain its tertiary nucleus: hence, possibly, the concentric appearance above-mentioned may be referred to the series of successively enclosed cell-walls (D). And changes such as these may equally occur with more than two nuclei: a cell of any grade, primary, secondary, or later, may be filled with a numerous "brood" of nuclei, in which all the above-described changes (but not the same in all) may be repeated.

(*d.*) The laminated capsules, as I have called them ("globes épidermiques" of Lebert), are the most singular and characteristic structures of the epithelial cancers (fig. 61).

* Epithelial cancer-cells, with endogenous development of nuclei, as described in the text. Magnified 350 times.

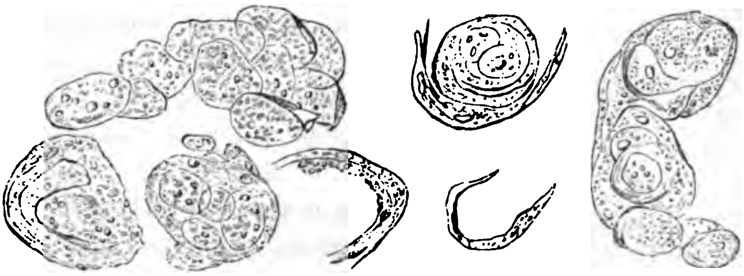
They are not, indeed, peculiar to this disease; for I have found exactly corresponding structures in the contents of an epidermal and sebaceous cyst; and so has V. Barensprung;* and I have illustrated a corresponding mode of formation in some of the many-nucleated cells of myeloid tumours (fig. 33, p. 224). However, they are nowhere so frequent or so well marked as they are in nearly every epithelial cancer.

Their great size at once attracts the eye: they are visible even to the unaided sight, especially when the softer curdy material of the cancer, in which they are generally most abundant, is pressed-out on glass. They appear, at first sight, like spherical or oval cysts, from $\frac{1}{100}$ to $\frac{1}{500}$ of an inch in diameter, walled-in by irregular fibrous tissue, and containing granular matter, nuclei, or cells, obscurely seen within them (fig. 61, C). They may be clustered together in a mass or a long cylinder (D); but, by breaking them up, or looking more closely, it becomes evident that the appearance of fibrous tissue is due to one's seeing the edges of epithelial scales, which, in successive layers, are wrapped round the central space. Such scales may be broken off, in groups of two, three, or more, retaining the curved form in which they have lain (fig. 61, A). When detached, they generally appear like the dryest and most filmy of the epithelial scales composing the rest of the cancer (B): often they are folded, and look fibrous even when separated; their nuclei are shrivelled or not visible; their contents are often granular. As they lie

* As quoted by Virchow (Archiv, iii. 200). I have said (p. 373) that I have never seen such structures in medullary cancers. Rokitansky delineates some (Ueber die Cyste, figs. 9, 10, 11), but with less perfect structures than are common in epithelial cancers. I would add, that what was said in p. 373 respecting the rarity of endogenous cells in medullary cancers relates only to such as occur in external parts: I must believe, from the reports of others, that they are more frequent in cancers of internal organs.

superposed, they appear closely compacted; but not unfre-

FIG. 61.*



quently granules are distinct in the outer laminar spaces, or on the inner surface of detached pieces.

The contents filling the central spaces in these laminated capsules are extremely various; sometimes, or partly, granular and oily particles diffused in some nebulous material; more often, or with these, cells or nuclei (C, D). Sometimes one cell is thus enclosed, sometimes two or more: and these not scale-like, but oval or round and plump, having distinct and generally large nuclei; or a crowd of nuclei may be enclosed: and briefly, these nuclei may appear in any of those various states which I described just now in the account of the endogenous epithelial cells. Indeed it is probable that the last sentence of that description (p. 439) might begin the history of the development of these capsules; for I know no method of explaining them, except that taught by Rokitansky, and illustrated by the diagrams copied here (fig. 62†).

In one of the simplest cases, we may suppose a nucleus largely *inflated* and filled with a brood of (say four) secon-

* Fig. 61. Laminated epithelial capsules, described in the text, magnified about 250 times.

† From his essay, Ueber die Cyste; fig. 8.

dary nuclei, which proceed to the formation of secondary cells (fig. 62, A). If, now, only one of the nuclei of these secondary cells becomes enlarged, it will not only extend its own cell's wall into contact with that of the cell containing it, but will at the same time press the three other cells into similar contact, and thus appear invested with laminated epithelial scales. Such a state, with the nuclei of the investing scales, is shown in B. A greater complexity of similar events is shown in C, in which, among a very large number of secondary endogenous nuclei, many are persistent as nuclei, while others, developed to nucleated cells, are laminated around them. But among the nuclei, two are represented as enlarged and containing tertiary "broods" of nuclei, among which the same changes have ensued as in the preceding generation. And it is evident that if any in the group *a* had now singly enlarged, the rest, with all the cells and nuclei around them, must have arranged themselves or been compressed into imbricated scales, so as to form a large laminated capsule.

FIG. 62*.

A B

C

The component structures now described appear to be disorderly placed in the mass of epithelial cancer, in the interstices of the natural structures, or of their remains. I have never seen any of them within a natural structure, *e. g.* within a muscular fibre. The laminated capsules are, I believe, most abundant in the softer substance, but they

* Fig. 62. Diagrams of the production of the laminated epithelial capsules; from Rokitansky.

are not confined to it. The texture of the mass is such as makes it very difficult to obtain a sufficiently thin section with the structures undisturbed; but in sections of scrotal cancers I have seen the laminated capsules imbedded at distant intervals among the simpler epithelial structures, and the turgid large capillaries ascending towards the surface and forming near it simple or undulating loops. The epithelial structures appeared to be in contact with the walls of the blood-vessels, supported by a wide sparing meshwork of fibro-cellular tissue growing up from the adjacent tissue of the scrotum.

In whatever part or organ they may be found, there is a remarkable uniformity in the characters of the epithelial cancer-structures. Deviations, however, from such as I have described as the normal structures are sometimes found. I have once seen a melanotic epithelial cancer: it grew in the deeper part of the cutis and in the subcutaneous tissue, under a dark pigmentary nævus or mole, in a woman who had many similar moles on various parts of her body: a thin layer of the cutis, with its covering of dark epidermis, extended over the cancer and was slightly raised by it. The epithelial shape and texture of the cancer-cells were well-marked, but most of them contained melanotic matter; in some, a quantity of brownish molecular matter was either diffused or collected about the nucleus or its place; in some, with similar molecular matter, there were two, three, or more brown corpuscles, from the size of mere molecules to that of blood-cells. Materials like those within the epithelial cells existed, also, more abundantly as an intercellular substance.

Cells like cylindriform epithelium-cells may also be mingled with the more usual form. I have seen this in a case of large "cauliflower-excrescence" of the uterus, in the very substance of which the cylindriform cells were found.

Bidder describes a similar occurrence in a cancer of the stomach* and duodenum; and Rokitansky,† in the same parts.

I believe, also, that cases may be found in which the cancer-cells, or part of them, have characters intermediate, or transitional, between those of the epithelial and of the scirrhous or medullary diseases. I have mentioned the existence of the large free nuclei (p. 437), and the full plump cells in the capsules (p. 441) in epithelial cancers; and I believe that I have seen cancers with all their cells of intermediate shape. But the point is very difficult to determine. Young epithelial-cells are less flattened and scale-like, and have larger and clearer nuclei, than those of completed formation: in these characters they approach to the appearance of the other cancer-cells; and if, in a quickly-growing mass, they occur alone, they may produce a fallacious appearance of an intermediate form of cancer. Moreover, two kinds of cancer may be mingled in one mass. Lebert and Hannover have satisfied themselves of this; and such a specimen as they describe may have deceived me. As yet, therefore, I can have only a belief in the existence of such intermediate forms.

The foregoing description has been drawn, almost exclusively, from cases of epithelial cancer in integumental parts, and the varieties which it may present in different localities are so slight and inconstant that such references as I have already made to them may suffice. But certain

* Müller's Archiv, 1852, p. 178.
† Ueber den Zottenkrebs, pp. 11, 18.

examples of the disease, in other than integumental parts, need separate description.

The Lymphatic Glands, in anatomical relation with the primary seat of an epithelial cancer, usually become similarly cancerous in the progress of the disease; and, I think, sooner or later in that progress, in direct proportion to its own rapidity; following in this, the same rate as in other cancers. From the glands nearest to the primary seat, the disease gradually extends towards the trunk, yet seldom reaches far. I have known the whole line of cervical glands affected in epithelial cancer of the tongue; and the lumbar glands may become diseased with the penis or scrotum; but much more often, the proximate cluster of glands alone becomes cancerous, and those more distant are swollen and succulent, but contain no cancerous matter. This, however, must not be taken to imply a continuous extension of the disease from the primary seat to the glands; for large intervals of apparently healthy tissues often intervene. I have seen, with epithelial cancer of the back of the hand, the lymphatic gland near the bend of the elbow similarly cancerous throughout; but the whole forearm was healthy.

Last summer I amputated an old man's hand with a similar cancer; and I have lately seen him with all his axillary glands diseased, but with no sign of cancerous lymphatics or other disease in the arm.*

In some cases the diseased glands appear in a large

* Such cases do not prove—they only make it very probable—that there was no cancerous affection of the lymphatic vessels between the primary disease and the glands. Such continuous disease has been traced from scirrhous cancers of the breast to the axillary glands; and I once found epithelial cancer-cells in the dental canal, when primary disease existed in the gum and alveolar part of the jaw, and secondary disease in a submaxillary lymphatic gland.

cluster, forming one lobed mass; in others, a chain of small glands is felt, such as one might not suppose to be cancerous, except for their hardness. The cancerous elements in the glands resemble those in the primary disease; indeed, I have found even slight modifications of general character in the one, exactly repeated in the other.* They are inserted among the natural structures of the gland. At first, I think, they usually apppear in circumscribed masses, occupying only a certain part of the gland; but these, gradually increasing, at length exclude, or lead to the removal of, the whole of the original tissues.

The diseased glands are enlarged, hardened, smooth-surfaced, and usually retain their natural connection with the surrounding tissues. On section, part or the whole of the gland presents the same appearance as a section of primary epithelial cancer; and, generally, the opaque white crumbling substance, like scrapings from macerated epidermis, is abundant. One can remove masses of it, and leave only the capsule of the gland, or some remains of gland-substance that bounded the spaces that it filled.

Glands thus diseased are not unfrequently the seats of acute inflammation, in which, with fatty degeneration of the cancer-cells, suppuration may ensue: they may discharge the pus, as from a common bubo, and may continue many

* In one case of epithelial cancer of the tongue, and in another of the larynx, I found the lymphatic glands affected with what, according to both general and microscopic characters, could only be regarded as firm medullary cancer. It is possible that, in these cases, the primary disease was of mixed kinds—medullary and epithelial: just as there are examples of mixed cartilaginous and medullary tumours, in which only the medullary disease is repeated in the lymphatic glands (see p. 208). But I found no evidence of this mixture of diseases in the primary growth; and I think it equally possible that the cases may be compared with the rare instances of secondary medullary, associated with primary scirrhous, cancer.

days thus suppurating. But the end of this is, that large and deep cancerous ulcers, such as are already described, form in them and the adjacent tissues, and the progress of these is often more serious than that of the primary disease.

I have seen one example of primary epithelial cancer in lymphatic glands, which I will relate, both for its own interest, and because it illustrated many of the foregoing statements. The patient, who was in St. Bartholomew's Hospital last summer, was a sweep, 48 years old: his skin was dusky and dry, and many hair-follicles were enlarged by their accumulated contents; but he had no appearance of cancer, or wart of any kind, on the scrotum or penis: yet his inguinal glands were diseased just as they commonly are in the later stages of scrotal soot-cancer. On the right side, over the saphenous opening, a cluster of glands formed a round tuberous mass, more than an inch in diameter. It felt very firm, heavy, ill-defined, and as if deep-set. Over its most prominent part the skin was adherent, and ulcerated, and a soft dark growth protruded through it. Above this mass were three glands enlarged, but not hardened. On the left side, below the crural arch, one gland was enlarged to a diameter of half an inch, and hard; and four others felt similarly but less diseased. All these were moveable under the skin.

This disease had been observed in progress for fifteen weeks, having begun in the right groin as a hard lump under the skin, like those which were now in the left groin, and which had commenced to enlarge somewhat later. The ulceration in the right groin had existed for a week.

I removed all the glands that seemed diseased. The chief mass, from the right side, appeared, on section, lobed, soft, greyish, motttled with pink and livid tints. The same changes, but with increased firmness, were seen in the largest gland from the left side; and the material pressed from both these (a turbid, grumous, and not creamy, substance) contained abundant epithelial cancer-cells. The other glands were not evidently cancerous; but, during the healing of the operation on the right side, a gland, which I had thought it unnecessary to remove, enlarged and became hard: it was destroyed with chloride of zinc, and then the wounds healed soundly.

The Epithelial Cancer of the LUNGS, which I referred to (p. 413) as having once seen, occurred in an old man whose penis was amputated eighteen months before death. The disease soon returned in the inguinal glands, and I received these and the lungs for examination. The other organs were reported healthy.

A cluster of three or four glands were compressed in a large mass, of which a part protruded through an ulcerated opening in the skin. On section, nearly the whole of the gland-substance appeared replaced by the peculiar and oft-mentioned whitish, half-dry, friable substance, with greyish mottlings and streaked with blood-vessels. In this substance all the structures of epithelial cancer, with abundant laminated capsules, were perfectly distinct: they might have been taken as types.

In the lungs there were about twenty masses of similar cancerous substance; and of one large mass, at the root of the right lung, I could not be sure whether it were in the lung itself or in a cluster of bronchial glands. They were nearly all spherical, or flattened under and in the pleura, and measured from ¼ of an inch to nearly 3 inches in diameter. Their substance was opaque-white, marbled with pale yellow and pink, intersected by lines of grey and black (belonging apparently to the involved interlobular tissue of the lungs), and marked with blood-vessels. They were compact, but brittle and crumbling under pressure: several of the largest were softer and more friable at their centres than elsewhere, and the largest three had great central cavities, filled with softened cancerous matter and pus: they might have been called "cancerous vomicæ;" but they were completely bounded by layers of cancer, rough and knotted on their inner surfaces, and had no communication with air-tubes. From one mass an outgrowth projected into, and had grown within, a bronchial tube; from another a similar growth extended into a pulmonary artery.

The crumbling, brittle texture of these masses, and the absence of creamy "juice" in even the softest parts, might have sufficed, I believe, to declare that these were not masses of scirrhous or medullary cancer: but the microscopic examination left no doubt. Their minute structures accorded exactly with those in the inguinal glands: not a character of the epithelial cancers was wanting.*

Epithelial Cancer in the HEART is illustrated in the Museum of St. Bartholomew's.† A man, 58 years old, had a granulated and warty epithelial cancer, which covered the anterior and inferior third of his eye, and was firmly combined with the conjunctiva and parts of the sclerotica and cornea. Mr. Wormald removed the eye-ball with all the disease. Two years afterwards, the man died with a large tumour over the parotid gland; and a mass of cancer, about an inch and a half in diameter, was imbedded in the substance of the apex of the right ventricle

* Portions of the lungs and of the inguinal glands, in this and in the last-described case, are in the Museum of St. Bartholomew's.

† Series xii. 60. In the Catalogue the disease is described as medullary cancer; but I have recently examined microscopically both it and the primary growth (Series ix. No. 17): and they are certainly epithelial cancers.

and septum of the heart. The mass is soft and broken at its centre, and has the microscopic structures of epithelial cancer.

In the Uterus, and the adjacent part of the Vagina, the epithelial cancer may be found with ordinary characters, such as were described at the beginning of the lecture; but its more remarkable appearance is in the form of the "Cauliflower-Excrescence." Only a part, however, of the cases to which this name has been ascribed have been epithelial cancers: of the rest, some were medullary cancers, and some, perhaps, simple non-cancerous, warty, or papillary growths.

My own observations of this disease have only sufficed to confirm (wherever I could test them) those far more completely made by Virchow,* whose results, approved by Lebert, and consistent with the best earlier records, I shall therefore quote:—"One must distinguish three different papillary tumours at the os uteri—the simple, such as Frerichs† and Lebert‡ have seen; the cancroid; and the cancerous,"—[*i. e.* the epithelial-cancerous and the medullary-cancerous]:—the first two forms together constitute the cauliflower-growth. This begins as a simple papillary tumour, and at a later period passes into cancroid [epithelial cancer]. At first one sees only on the surface papillary or villous growths, which consist of very thick layers of peripheral flat, and interior cylindrical, epithelial cells, and a very fine interior cylinder formed of an extremely little connective tissue with large vessels. The

* Würzburg Verhandl. 1850, B. i. 109. They were chiefly made in the cases described by Mayer in the Verhandl. der Gesellsch. für Geburtshülfe in Berlin, 1851, p. 111.

† Jenaische Annalen, p. 7.

‡ Abhandlungen, p. 57, 150.

outer layer contains cells of all sizes and stages of development; some of them forming great parent-structures with endogenous corpuscles. The vessels are, for the most part, colossal very thin-walled capillaries, which form either simple loops at the apices of the villi, between the epithelial layers, or towards the surface develope new loops in constantly increasing number, or, lastly, present a reticulate branching. At the beginning of the disease, the villi are simple and close-pressed, so that the surface appears only granulated, as Clarke describes it: it becomes cauliflower-like by the branching of the papillæ, which at last grow out to fringes an inch long, and may present almost the appearance of an hydatid-mole.

"After the process has existed for some time on the surface, the cancroid alveoli begin to form deep between the layers of the muscular and the connective tissues of the organ. In the early cases I saw only cavities simply filled with epithelial structures; but in Kiwisch's case there were alveoli, on whose walls new, papillary, branching growths were seated—a kind of proliferous arborescent formation."

It will be evident, from this description, that the cauliflower-excrescence, in the two conditions distinguished by Virchow, illustrates the usual history of the most exuberant epithelial cancers (p. 417): it might be taken as the principal example of the group. That which he calls the "simple papillary tumour" is an excessive papillary outgrowth of epithelial cancer; the later stage of the same, when it "passes into cancroid," is the usual extension of such a cancer into deeper parts,—a continuous growth of the same thing in a new direction. For the papillary structures, *composed*, as Virchow says, of epithelial cells with blood-vessels and a very little connective tissue, are the essential characters of the epithelial cancerous outgrowths; and I believe that the same composition has never been seen in any papillary or warty growths, that did not, if time were allowed, proceed to the formation of epithelial structures in the deeper parts, and thence through the usual progress of malignant disease.

Before entering on the pathology of epithelial cancers it will be useful to refer briefly to the morbid anatomy of the diseases with which they have most affinity, and from which it is most necessary to distinguish them,—at least, as clearly as we can. These are, on the one side, the scirrhous and medullary cancers; and, on the other, certain rodent ulcers and warty growths of scars.*

The descriptions in former lectures of the scirrhous and medullary cancers of the skin and subcutaneous tissue may suffice for the distinction from them (compare pp. 309, 313, 383).

The *Rodent Ulcer* is the disease which has been described under various names: such as cancerous ulcer of the face, cancroid ulcer, ulcère rongeant, ulcère chancreux du visage, der flache Krebs, moosartige Parasit, ulcus exedens, noli me tangere. In its earliest appearance, on its most frequent seat, it has been called cancerous tubercle of the face. It has been confounded by many with different forms of cancer; yet it is distinct from them in structure as well as in history, and had better be described by some

* The whole of this subject is admirably illustrated by Mr. Cæsar Hawkins, in papers in the Medico-Chir. Trans. vols. xix. and xxi., and in the Medical Gazette, vols. xxviii. xxix. Indeed, I can add nothing to his account, except such conclusions as are derived from microscopic examinations of the diseases. One of Mr. Hawkins' lectures relates to cheloid growths; but to these it seems unnecessary to refer: if they could be confounded with any form of cancer, it would be with scirrhous cancer of the skin.

name which may not add to the yearly increasing confusion that arises from the use of terms expressing likeness to cancer.

Sir B. C. Brodie thus describes the most frequent characters of the disease :*—" A man has a soft tubercle upon the face, covered by a smooth skin. He may call it a wart, but it is quite a different thing. On cutting into it you find it consists of a brown solid substance, not very highly organized. A tumour of this kind may remain on the face unaltered for years, and then, when the patient gets old, it may begin to ulcerate. The ulcer spreads, slowly but constantly, and, if it be left alone, it may destroy the whole of the cheek, the bones of the face, and ultimately the patient's life; but it may take some years to run this course. So far these tumours in the face, and these ulcers, are to be considered as malignant. Nevertheless, they are not like fungus hæmatodes or cancer; and for this reason, that the disease is entirely local. It does not affect the lymphatic glands, nor do similar tumours appear in other parts of the body."

The constantly progressive ulceration is a character in which this disease resembles cancer, especially epithelial cancer. The likeness in this respect may indicate some important affinity between them; but the differences between them are greater; for not only is the rodent ulcer usually unlike that of any cancer in its aspect, rate, and mode of progress, but the tissues bounding it, and forming its base and walls, never contain any epithelial or other cancerous structure; they are infiltrated with only such structures as may be found in the walls of common chronic ulcers.

The most usual characters of the rodent ulcer, whether

* In his Lectures on Pathology and Surgery, p. 333.

on the cheek, the eyelids, upper lip, nose, scalp, vulva, or any other part, are as follows :*—It is of irregular shape, but generally tends towards oval or circular. The base, however deeply and unequally excavated, is usually, in most parts, not warty or nodular, or even plainly granulated; in contrast with cancerous ulcers, one may especially observe this absence, or less amount, of up-growth. It is, also, comparatively dry and glossy, yielding, for its extent, very little ichor or other discharge, and has commonly a dull reddish-yellow tint. Its border is slightly, if at all, elevated; if elevated, it is not commonly or much either everted or undermined, but is smoothly rounded or lowly tuberculated. The immediately adjacent skin appears quite healthy. The base and border alike feel tough and hard, as if bounded by a layer of indurated tissue about a line in thickness. This layer does not much increase in thickness as the ulcer extends; and herein is another chief contrast with cancerous ulceration: in the progress of the rodent ulcer we see mere destruction, in the cancerous we see destruction with coincident, and usually more than commensurate, growth.

The indurated substance at the base and borders of the ulcer appears, on section, very firm, pale greyish, uniform or obscurely fibrous; little fluid of any kind can be pressed from it. It is composed of the same elementary structures as common granulations are, and these, in the deeper layers, are inserted among the tissues on which the ulcer rests. I have examined very carefully six of these ulcers, removed

* The parts enumerated were the seats of disease in the cases from which I have drawn my description, and in which it is, I believe, most frequent; but it is not confined to them. Lebert refers to cases of it, in his account of the cancroid of the uterus, and suggests (what is highly probable) that the simple chronic, or perforating, ulcer of the stomach is a disease of the same nature.

by excision, and have never seen in or near them a structure resembling those of epithelial or any other form of cancer. Lebert's observations, I believe, fully coincide with mine; though he classes the disease with epithelial cancers, under the general name of Cancroid. Mr. Joseph Hutchinson, also, has made several examinations of pieces cut, during life, from the margins of rodent ulcers, and always with the same result; they never contained structures resembling those of epithelial or any other cancer.

Thus the anatomical distinction between this disease and cancer is evident, and they are equally different in pathology; the rodent ulcer, so far as it has yet been observed, is never attended by similar disease in the lymphatics or any other part; and if completely removed or destroyed it does not recur.

The *Warty Growths on Scars* (Cancers of Cicatrices) are usually well-marked papillary epithelial cancers, which grow in the place of scars remaining after injuries or common ulcers. Mr. Hawkins,* who has given a very full account of their general characters and progress, describes cases in the scars of burns, gunshot-wounds, floggings, and ulcers. All that I have seen were on the lower extremities, and connected with scars after repeated injuries.†

The description already given of the warty epithelial cancers may suffice for these. They usually exemplify very well the wide-spread growth and cancerous change in the papillæ; the enlargement, at first probably simple, and

* Medical Gazette, vol. xxviii. 872; and Med.-Chir. Trans., xix. See, also, the Dublin Quarterly Journal, 1850-51.

† They are amply illustrated in the Museum of St. Bartholomew's, Ser. i. and Ser. xxxv. 40. Several cases are described by Mr. Stanley (Treatise on Diseases of the Bones, p. 360).

afterwards with cancerous formation, in the papillæ of the adjacent skin; the deep extension of the disease to the periosteum, and thence onwards, even to the complete penetration of the bones and other subjacent tissues; and, at a late period, the cancerous disease of the lymphatic glands. But it is important to be aware that this disease may be closely imitated by warty growths and ulcers, in and about which no cancerous matter can be found. I examined very carefully such an ulcer with prominent growths on the front of a man's leg. It was seated in the middle third of the leg, in the place of a large old scar after a scald, and the greater part of the ulcer presented high, lobed and nodulated, hard granulations. No one doubted, before the amputation, that the disease was the usual form of cancer ensuing in these conditions; yet no cancer-structure could be found; in whichever part I examined, I could find only inflammatory products, and such corpuscles as compose ill-developed or degenerate granulations upon common ulcers.

I think some of the diversities of opinion respecting the nature of these warty growths and ulcers may be due to the want of distinction between those which are, and those which are not, epithelial cancers. To the naked eye and during life the two diseases may be very much alike; but the difference in their respective minute structures would indicate essential difference of nature: certainly, in the pathology of epithelial cancer, caution is necessary in reckoning any of these cases that are without microscopic examination.

I would add, that I have no doubt the epithelial growth, in some cases, proceeds from the periosteum or other subcutaneous tissues, and thence extends into and through the skin. I have seen the growth protruding through an ulcerated aperture in the scar, just as any deep-seated tumour might. Such cases justify Mr. Stanley's description of the disease as one, primarily, of the periosteum.

LECTURE XII.

EPITHELIAL CANCER.

PART II.—PATHOLOGY.

Among all the cancers, the epithelial present the general or constitutional features of malignant disease in the least intense form. They commence at the latest average period of life; they appear to be most dependent upon local conditions; they are least prone to multiplication in internal organs; they are associated with the least evident diathesis or cachexia. And yet I believe that, in a large survey of them, none of the features of malignant disease, as exemplified in the scirrhous and medullary cancers, will be found wanting: the difference is one of degree, not of kind.

(*a*) A large majority of the cases of epithelial cancers occur in males. In 105 cases, affecting parts common to both sexes, 86 were in men and 19 in women. In the cases affecting the sexual organs themselves, I think the proportion is nearly equal; unless we reckon the scrotal soot-cancers, which, for obvious reasons, we should more properly exclude.

(*b*) A few cases are on record, transmitted from book to book, in which what were probably epithelial cancers occurred before adult life. Sir James Earle saw a scrotal soot-cancer in a child eight years old;* so did Mr. Wadd;† and M. Lebert‡ examined a "cancroid" growth at the vulva in a child 3½ years old, in whom it was almost congenital. But cases such as these cannot be taken into our estimate of the influence of age in determining the access of the disease. In the following table, I have included no cases that were recorded merely or chiefly on account of the patients' ages:§—

Age.	No. of Cases.
20 to 30	9
30 to 40	22
40 to 50	40
50 to 60	32
60 to 70	30
70 to 80	10
	143

If now, as in the last two lectures (pages 326, 390), we calculate, from this table, the frequency of epithelial cancer

* Pott's Works by Earle, iii. p. 178.

† Curling on the Diseases of the Testis, p. 528.

‡ Traité pratique, p. 676. Hannover (Das Epithelioma, p. 104) quotes from Frerichs a case in which the disease extended from the ear through the petrous bone in a male 19 years old.

§ The table includes cases from Lebert, Hannover, and others. But I have omitted, both from it and from the preceding one, Lebert's cases of "cancroid" of the face. They were examples of rodent ulcers, and their contrast with epithelial cancers (of the lip, for example) is well shown, in that the average age for their coming under operation is 17 years later, and the proportionate frequencies in the two sexes is reversed. The ages assigned in the above table are, with few exceptions, those at which the disease was first observed *by the patients*.

in proportion to the number of persons living at each of the successive periods, it may be represented by the following numbers (100 being, as before, taken to express the frequency between 40 and 50) :—

20 to 30 years . . .	12
30 to 40 " . . .	41
40 to 50 " . . .	100
50 to 60 " . . .	119
60 to 70 " . . .	163
70 to 80 " . . .	111

We may probably deduce from this calculation, that the conditions favourable to the production of epithelial cancers regularly increase with the increase of age; for, the apparent diminution after 70 may be reasonably ascribed to the comparatively small proportion of persons beyond that age who are received into hospitals, or who are under such surgical treatment as to have their cases recorded.

The proportions expressed by the foregoing general tables are nearly true for the epithelial cancers of each part most liable to be affected: the only notable peculiarities, I believe, are, that the mean age of its occurrence is lowest in the sexual organs, and highest in the integuments of the head, face, eyelids, and upper extremities.

(*c*) An hereditary disposition to soot-cancer has been several times observed: as, by Mr. Earle,* in a grandfather, father, and two sons; by Mr. Hawkins,† in a father and son; by Mr. Cusack,‡ in a mother and son; by myself (twice) in two brothers. But all the persons here referred to were engaged in the same trade, and their exposure to

* Med.-Chir. Trans., xii. 305.

† Medical Gazette, xxi. 842.

‡ Quoted by Mr. Curling (On Diseases of the Testis, p. 528).

the same exciting or predisposing cause of the disease diminishes the value of the facts as indications of hereditary predisposition. I have no certain record of other epithelial cancers occurring in many members of the same family; but I have found some significant facts indicating a disposition to epithelial cancer, in members of those families in which other members have had scirrhous or medullary cancers.

Among 160 instances of cancer, in most of which the point was inquired into, though none were collected for the sake of it, these cases were found:—(1) A man had medullary cancer of a toe: his father had cancer of the lip. (2) A woman had repeated epithelial cancers of the labia: her sister, her father's sister, and her mother's brother's daughter, had cancer of the breast. (3) A man had epithelial cancer of the lip, whose grandmother had cancer of the breast. (4) A gentleman had epithelial cancer of the interior of the cheek: his aunt died with cancer of the breast. (5) A woman had medullary cancer of the breast: her mother had cancer of the uterus, and her uncle cancer of the face. (6) A woman had scirrhous cancer of the breast, whose mother's uncle had cancer of the lip. (7) Of another woman with similar cancer, one cousin had cancer of the lip, another cousin cancer of the uterus. (8) A third woman had scirrhous cancer of the breast, whose grandfather had cancer of the lip.*

The proportion of these cases (only $\frac{1}{20}$ of the whole

* Dr. Warren mentions this:—A grandfather died with a cancer of the lip. His son and two daughters died with cancer of the breast. One of his grandsons and one of his granddaughters had also cancer of the breast (On Tumours, p. 281). It may be objected, by some, that the cancers of the lip here referred to were not epithelial. I assume that they were, because of the exceeding rarity of any other kind in the lip: indeed, I have not yet seen one, or a complete record of one, in which the microscope did not find the epithelial structures.

number) may seem too small to be even suggestive; yet it is too large to be referred to chance. Let it be contrasted with these facts:—(1) I have found that among 116 patients* with cancer, only one was aware of any member of the same family having had a simple tumour. This was a woman with scirrhous cancer of the breast, from whose sister a myeloid tumour of the breast had been removed. (2) Among 77 patients with non-cancerous tumours, 10 were aware of near relations having had similar diseases: but among the same 77, the only cases of family-connection with cancers were the following:—(*a*) The cases of recurring and disorderly-growing mammary tumour related at page 260; (*b*) the case of anomalous cartilaginous tumours at page 187; (*c*) that of the same woman whose case was just mentioned as one of myeloid tumour of the breast: five years after its removal, she and her sister were at the same time in St. Bartholomew's with scirrhous breasts; (*d*) that of a lad with mixed cartilaginous and glandular tumour over his parotid gland, whose grandmother had cancer of the breast. Now of these cases the first two must be regarded, I believe, as instances of a cancerous disposition, modified and gradually ceasing in its transmission from parent to offspring (see page 260, &c.); the third is a very anomalous one, exemplifying the formation of a most rare tumour in the breast, not long before it became cancerous; the fourth alone is an instance of an ordinary simple or innocent tumour growing in one who had a cancerous relation.

I have referred to these cases, not to suggest that when cancer has occurred in one or more members of a family,

* These were part of the 160 mentioned above; but I have here reckoned only the cases recorded by myself, because it is probable that, even if, among the others, any instances had occurred of innocent and malignant tumours in the same family, they would not have been mentioned.

the rest are peculiarly unlikely to have innocent tumours, but to show, by contrast, that the proportion of cases in which epithelial and other cancers occur in the same family is, relatively, considerable. For if that proportion were the result of chance-coincidences or errors in observation, an equal, or nearly equal, proportion of coincidences should have appeared in the opposite set of cases. But the contrast between the two sets of cases is remarkable; and I believe the facts may be justly regarded as evidence for the close affinity between epithelial and other cancers, and as an illustration of the modification which the cancerous and other diatheses may undergo in their hereditary transmission.

(*d*) Among 34 patients with epithelial cancers, 19 were aware of injury or previous morbid condition in the affected part;—a much larger proportion than is found among patients labouring under tumours of any other kind, except melanoid cancers of the skin.

In certain cases, injury by violence appears as the exciting cause. But the histories of epithelial cancers differ from those of others in that the kind of injury which is most effective in their production is such as is often inflicted—frequent blows or slight wounds on the same part; hurts of scars and other seats of old injury. It is as if it were necessary that the part should be considerably changed in structure, before it is appropriate for a cancerous growth.

It agrees with this that, in the majority of cases, patients assign, as the cause of the disease, not injury, or not it alone, but some former disease, especially such as arises from long-continued irritation of a part. Thus epithelial cancers arise sometimes in old ulcers, as on the legs, or, as I have known, in perineal urinary fistulæ; sometimes, in those of more rapid progress, as I once saw in a case of necrosis of the hard palate, and once in a case of necrosis of the angle of the lower jaw, and, as Frerichs describes, in an ulceration of the internal ear following scarlet fever. The majority of the epithelial cancers of the prepuce and glans occur in those who are the subjects of congenital phymosis, and in whom we may assume the frequent irritation of the part by decomposed secretions. In some rare cases, a mole or pigmentary nævus becomes the seat of the disease. But, among all the things referred to by patients, none are so frequently named as "warts."

The affections thus named are not usually such as are commonly called warts. They are not usually like the warts (Verrucæ, or Condylomata elevata) that grow on the genital organs during gonorrhœal or other similar irritation; nor like such warts (Verrucæ vulgares) as are common on the hands of young people before puberty; nor like the condylomata (C. lata) of syphilis. Such papillary growths as these may, I believe, precede epithelial cancer; but I think they rarely do so. The general condition of the "wart" is, I think, that a small portion of the cutis is slightly indurated; its papillæ are, generally, in some measure enlarged; and it is covered with a darkish dry crust, or with a scab, or, if the part be very moist, with a soft layer of detached scales.* The induration of the cutis, and the predominance of the crust or other covering, (which apparently constitutes more of the disease than either the induration or the papillæ,) mark the chief differences between this disease and any of the "warts" just referred to. The induration, which patients often describe as "a little hard knot," is usually attended with elevation, but sometimes

* Such as these are well described by Schuh (Pseudoplasmen, p. 46), under the title "barky warts." With the same intimation of likeness, Dr. Warren (On Tumours, p. 27) called the disease "Lepoides."

with contraction and depression of the piece of cutis. The crust consists, for the most part, of epidermal scales held together by dried secretion, or, in its deepest layers, forming whitish friable substance, and fitting between the papillæ. It is easily detached and quickly removed; and, when it is removed, the subjacent cutis does not usually appear raw or bleeding, but is tender, florid, and as if covered with a very thin glossy layer of epidermis. When a moister yellow scab covers the induration, the surface beneath it is usually more inflamed and excoriated, and the papillæ are more enlarged.

Such incrusted warts as these are very common, especially on the faces of old persons: the large majority of them lead to no further trouble; yet some become the seats of epithelial cancers, and some of rodent ulcers. A similar affection often precedes the epithelial cancer of the lower lip. Some slight violence often applied, such as that of a short pipe habitually supported by the lip, or the frequent slight rending of the surface of a dry scaly lip, or one much exposed to weather, leads to a "little crack:" this scabs over, and after repeated removals and renewals of the scab, there is a "little hard lump" or "a sort of wart," with a head or crust. And such a wart might be as often innocuous on the lip as on the face, if it were not that the lip is in the unhappy singularity of being within easy reach, at once, of the fingers, the teeth, the tongue, and the other lip; so that when it is as yet but slightly diseased, it is never left at rest.

A similar drily scaled or incrusted warty change of the cutis often, I believe, precedes the chimney-sweep's cancer; and I suspect that the true influence of the soot in this disease is not that its continued contact determines the growth of cancers, but (at least in part) that it produces a state of skin which provides an apt locality for epithelial cancer in persons of cancerous diathesis. How it does this I cannot imagine: but this is only one of many things unexplained in this strange disease; for the whole of the peculiarities of the chimney-sweep's cancer,—its dependence on soot, while coal-dust is wholly inoperative (for the disease is unknown among colliers); its comparative frequency in England, especially in the large towns, while in other countries where soot is abundant it is hardly seen; its selection of the scrotum for its most frequent seat,—all these, and many like facts in its history, appear completely inexplicable. Still, it is certain that scaly or incrusted small warts, such as I have been describing, are very common in chimney-sweeps. In many of them, even when they are thoroughly cleaned, the whole skin is dry, harsh, and dusky; and, before operation for the removal of scrotal cancers in them, it is a common question whether one or more warts or scaly patches near the chief disease should be removed with it. Nor are such warts confined to the scrotum; they may exist on every part of the trunk and limbs; and I have seen sweeps so thick-set with them, that a hundred or more might have been counted.

Such are some of the numerous morbid states, one or other of which may, in the majority of cases, be assigned as predisposing a part to become the seat of epithelial cancer. Expressions are sometimes used, implying that the part does not become the seat of a new morbid structure, but that its mode of action is changed, or that the change is only due to the extension and deepening of a common epidermoid or warty growth. The truer view, however, may be expressed by saying that the part, whatever were its previous state, becomes the seat of epithelial cancer, the structures of which, as of a new disease, are inserted among the original or previously morbid textures of the part. This evidently happens when the cancer appears in parts previously healthy, or in the deep-seated tissues, or in the walls of ulcers, or in a pigmentary nævus; for, in these cases, no morbid structures like those of the epithelial cancer existed previous to its access. There is more appearance of similarity and continuity of disease between the epithelial cancers and the warty growths by which they are sometimes preceded: for here both the earlier and the later disease may have, in common, an accumulation of epidermoid cells and an enlargement of papillæ. Yet the warts, whether incrusted or others, in which the epidermoid structures are only superficial, should also, I think, be regarded as only predisposing conditions of epithelial cancer; as diseased parts, not cancerous, though peculiarly apt to become the seats of this form of cancer. For the great majority of these are stationary affections, or may disappear, or be cured, even in cancerous persons; they are comparatively few in which, after a certain duration as simple warts, the cancerous disease is manifested. And the time of this change in them is often well-marked. Nearly all patients, —even those who can assign no date to the beginning of the wart or hardness, or other previous disease,—can refer exactly to some time of change in it, when it began to "grow up," or "be sore," or "get bad," discharge, or bleed. They thus mark the time when the cancerous mode of progress was commenced; and from this time the history of all such cases is nearly uniform—even remarkably uniform if it be compared with the variety of the histories of the previous states.

Now, I believe that this change in the life of the warty or other diseased part is always associated with a change in its structure; and that whatever were its previous state, its proper tissue, whether papillæ or any others, now become the seat of the formation of epithelial cancer-cells. It is hardly possible to prove such a change of structure in any single case, but it is rendered highly probable by this,—that in those warty structures which we remove because experience makes us believe that they are in progress as epithelial cancers, we find the tissues infiltrated with the specific cancer-cells: while in those which have been long stationary, without extension or outgrowth, without ulceration or ichorous discharge, no such infiltration is found. Certain cases must be excepted from this statement because of error in diagnosis. I have known rodent ulcers excised, in the belief that they were epithelial cancers; but I never saw any growth removed as an epithelial cancer, in which the epidermoidal cells were placed only on the surface of the vascular tissues; and on the other hand, I have never seen such cells *in* the cutis or papillæ of any incrusted or other wart, in which the cancerous mode of progress was not yet manifested. The opportunities of examining such warts as observation shows to be most apt to be precursors of epithelial cancer are rare: but I have examined some on the scrotum, and one on a lower lip. The last may deserve description.

A healthy-looking farmer, 66 years old, came to me with an induration, about two lines wide and half a line thick, at the middle of the florid margin of his lower lip. The indurated part was slightly sunken, and covered with a thin yellow scab. This disease had existed two years, frequently scabbing thickly, then desquamating, never soundly healing; yet it had made no progress. I removed it, chiefly because the patient's father, when 85 years old, had had cancer of the lower lip; and because, if not already cancerous, this could not but be thought a place very likely to become so. I found, in the indurated tissue, inflammatory products infiltrated among the natural structures of the skin: but no appearance of epithelial cancer-cells. The cutis was slightly thickened; but there was no evidence of enlargement of papillæ, or of accumulated epidermis: the scab seemed formed chiefly of dried secretion.

I believe that such a description as this would apply to most of the warts that precede epithelial cancers of the lower lip, and that we may justly say of them that they are not cancerous, but are such parts as, in certain persons, are peculiarly apt to be the seats of cancer. Why only some among them should become cancerous we can no more explain than we can why, among so many injuries inflicted, so few should be followed by erysipelas or tetanus; or why, among so many pigmentary moles or nævi as may be found, only few should become the seats of melanoid cancer; or, in a yet nearer parallel, why, when a person has many such moles, the melanoid cancer should appear in only one. In these varieties of fate, there is nothing unusual in warts, if we regard them as only predisposed to become cancerous; but, if we regard them as the first stages of a cancroid or cancerous disease, such varieties of progress as they manifest would be without parallel.

(*e*) The general health of patients with epithelial cancer is usually good, till it is affected by the consequences of the local disease. No primary cachexia can be observed preceding the appearance of the growth; nor does a secondary cachexia ensue earlier than it probably would in any disease of equal duration and severity.

When the formation of an epithelial cancer has once commenced, its natural course is as regularly progressive to the destruction of life, as that of either a scirrhous or a medullary cancer. Only, the rate, and some parts of the method, of progress are different.

The average rate of increase of epithelial cancers is less than of either of the other kinds. It is not apt to be arrested altogether; yet it is sometimes so slow that, in a year, the cancer may gain only a line or two in any of its dimensions. In other cases, however, and especially when such a cancer has been violently injured, the progress is much more rapid. I have known three-fourths of the scrotum covered with ulcerating soot-cancer, and part of the urethra surrounded by it, in three months after a laceration received while in apparent health: in another case, a spheroidal mass of soft epithelial cancer, an inch in diameter, formed in the substance of the cheek in two months; in another, a growth more than an inch in diameter formed in ten weeks; in another, the whole depth of the lower lip, and two-thirds of its width, were occupied with epithelial cancer, in three months after a blow on a little cancer at its margin; in another, within twelve months, the eyelids and a large part of the contents of the orbit were destroyed by ulceration, and tuberous masses, from one to three-quarters of an inch in diameter, were formed under the integuments of the brow, the temple, and the other boundaries of the orbit.

Cases such as these, and they are not rare, may prove the error of regarding epithelial cancer as a trivial or an inactive disease in comparison with the other forms. Its rate of progress is, like that of scirrhous cancer, widely various in different cases; it has its acute and its chronic instances. Of its modes of growth, and of ulceration, and of the usual coincidence of these processes, I have spoken fully in the former part of the lecture (p. 431); I will here only add that the ulceration, at whatever rate, seems constantly progressive. Some portions of the ulcer may appear, for a time, as if skinning over, or, portions of the disease may slough away, and the surfaces they leave may partially heal; but I do not remember to have seen any process of healing or wasting so nearly accomplished in an epithelial cancer, as I have described in some cases of both scirrhous and medullary cancer, in the former lectures (pp. 336, 402).

The progress of the ulceration, and the coincident deepening of the growth, are usually attended with great pain,—hot, scalding, and widely diffusing pain; or with pain like that of neuralgia darting in the course of nerves. With this, and the constant ichorous discharge from the ulcer, and the occasional bleedings from ulcerated blood-vessels, the patient becomes cachectic; yet probably not sooner than in other diseases of equal extent, nor in any very characteristic manner.

Primary epithelial cancers are usually single. Two growths may sometimes appear at once in the same region, as, *e. g.* on the prepuce and glans, or on the scrotum; but even this is rare. In the later progress of the disease, separate masses of epithelial cancer may be sometimes found in the tissues, or cancerous warty growths on the surface, around the primary growth or ulcer. Healthy tissue appears to intervene between these secondary cancers and the primary one: and they may be compared with the tubercles so often grouped around a scirrhous mammary gland.

The lymphatic glands, sooner or later in the progress of the disease, usually become cancerous. I have already (p. 445) described the manner of their infection. I feel almost disposed to think that epithelial cancer is a much worse disease in this country than in France or Denmark, when I see how far my observations on the affection of the lymphatics differ from those of Lebert and Hannover. Lebert* says that he has found the lymphatic glands

* Traité pratique, p. 619.

affected with "cancroid" three times in 81 cases; and of these 81, 60 were certainly cases of epithelial cancer. Hannover* has even less frequently seen them diseased. Now, in 42 cases of epithelial cancer collected in the ordinary course of hospital and private practice, and including many in the early as well as in the latest stages of the disease, I have observed the lymphatics cancerous twenty times. In the greater part of these cases, the characteristic cancer-structures were found in the glands removed during life or after death: in the rest, their existence was concluded, with scarcely less certainty, from the enlargement, with induration, rapid growth, clustering, and destructive ulceration of the glands. It need not be suspected that in any of these cases the glands were enlarged merely through "irritation:" such a state does, indeed, occur with epithelial as with scirrhous cancer, but the diagnosis of this from the cancerous enlargement is seldom, in either case, difficult.

I do not suppose that the proportion cited above expresses the greatest frequency of epithelial cancer in the lymphatic glands. I believe rather, that very few cases reach their natural end without infection of the glands. Even after the primary disease has been wholly removed, and when the glands at the time of the operation appeared healthy, they are frequently, and often alone, the seats of recurrences of the disease (p. 477). Sometimes, also, as with scirrhous cancers (p. 311), we find the disease in the lymphatics greatly preponderating over that in the primary seat.

My observations are scarcely less different from those of Lebert, in relation to the occurrence of secondary epithelial cancers in internal organs. In 18 autopsies (some of which, however, were made in fatal cases of rodent ulcer) he has not once found "cancroid growths" in any internal part.

* Das Epithelioma, p. 24.

In 7 autopsies,* I have found epithelial cancer once in the heart, and once in the lungs; [its appearance in these parts is described at p. 448.] Doubtless, the internal organs are more rarely infected than in any other form of cancer; but they do not enjoy an absolute immunity; the difference between the epithelial and the other cancers is, in this point again, one of degree not of kind.

It is a peculiarity of epithelial cancers, that in nearly all the characteristics of malignant disease—whether the propagation to the lymphatics or other organs, the extension to deep-seated parts, the recurrence after removal, or the rate of progress towards death—greater differences are noted according to the seat of disease than among the medullary cancers of different parts. The anatomical characters of the disease are in all parts essentially the same, but their history, in all the particulars noted above, differs, so as justify the expression that the disease is less malignant in some parts than in others. It is, generally, most malignant in the tongue, the interior of the mouth, and the penis; least in the lower extremities and the scrotum; in general, also, the epithelial cancers that are deep-seated are more malignant than the superficial.

These diversities make it very difficult to assign the average duration of life in persons with epithelial cancer; and the difficulty is greatly increased by the recorded cases being often mixed or confounded with those of other

* In two of these the disease had not reached its natural end; for the patients died in consequence of amputation. In another case I found epithelial cancer of the tongue, with medullary cancer of the cervical glands, and of the lungs; but, as I have already said (p. 446), though no medullary cancer-structures were found in the primary disease, it was impossible to prove that they had never existed, for a large portion of the tongue had sloughed before death.

cancers and of rodent ulcers. I have not been able to collect more than 30 cases, traced to the end of life. Of these, 12 were not submitted to operation; in the remaining 28, the diseased parts were once or more removed, and the operation was in none of these cases fatal. The average duration of life in the former was 38·6 months; in the latter 39·3 months; the general average of the whole was 39 months. But, with these cases, I have also those of 8 patients, still living beyond 39 months; and if these be reckoned with the other 30, they raise the average to 44 months.

I believe the true average duration of life with epithelial cancer is higher than 44 months; for the cases I have collected, being chiefly those of Hospital and other patients, who, when first seen, were in a state to be remedied by treatment, probably contain too small a proportion of those of longest standing. Probably four years is about the true average.

The following table will show the duration of life in the 38 cases, and may be compared with those in p. 345 and 406; the total difference produced by operations appeared too slight to make separate tables necessary:—

Duration of Life.	Number of Cases.
Less than 6 months	1
Between 6 and 12 months	1
„ 12 „ 18 „	7
„ 18 „ 24 „	4
„ 24 „ 36 „	5
„ 3 „ 4 years	3
„ 4 „ 6 „	3 dead 6 living
„ 6 „ 8 „	4 dead 1 living
More than 8 years	2 dead 1 living

The chief point which this table shews, in contrast with those of other cancers, is in the proportions of patients living more than four years. The proportion is here nearly half; while in the cases of scirrhous cancers it is only $\frac{1}{4}$, and in those of medullary cancers only $\frac{1}{15}$ (or, after operations, $\frac{1}{3.5}$ and $\frac{1}{6.4}$ respectively). An equal contrast is in the proportions of those dying within twelve months of the access of the disease: the proportions being, in the cases of epithelial cancers, less than $\frac{1}{15}$; of scirrhous cancers, nearly $\frac{1}{8}$; of medullary cancers, nearly $\frac{1}{3}$. In both these respects, however, differences may be noted among the epithelial cancers of different organs. I have not yet found a case of one in the tongue surviving more than four years; nor of one in the trunk or limbs destroying life in less than three years: a majority of those in the lower lip are fatal within four years, bnt some few survive that period. The age at which the disease commences has no great influence on its duration. The average duration among 14 patients, in whom it commenced at or below 45 years of age, was 39 months; that among 17, in whom it commenced later, was 45½ months; and the general average duration was not exceeded in the first list more often than in the second. There is, therefore, no well-marked correspondence, in this respect, between the epithelial and the scirrhous cancers. [Compare p. 345.]

A very trivial prolongation of life would appear, by the cases I have collected, to be obtained by the removal of epithelial cancers. But I would not use this result for more than general guidance in practice; for though I have no doubt that the common opinion of the epithelial cancers being trivial diseases, in comparison with the scirrhous and medullary, is very incorrect, yet I cannot doubt that, in some cases, permanent recovery, and, in some, a long period of health, follows their removal. I have seen a man whose leg was amputated twenty years previously for epithelial cancer commencing in or beneath a scar, and he was still well. A sweep was lately in St. Bartholomew's with a small scrotal cancer, from whom one of the same kind was excised thirty years ago. Of another, Mr. Curling* gives a history extending over twenty-two years, and including five operations. A man from whom Mr. Lawrence removed a cancer of the lip remained well for nine years, and then the disease appeared in the lymphatic glands.

Cases such as these must, I believe, be considered very rare. Too much regard to them, and the confusion of the rodent ulcers with the epithelial cancers, have led to a common belief that recovery or long life may be promised as the consequence of operations. Such a promise, if generally made, will very seldom prove true; and yet, as a general rule, the operation is to be advised, whenever the whole of the disease can be removed without great risk of life, or of producing worse deformity than already exists.

For (1) though the instances of operations followed by complete recovery, or by long immunity from the disease, are very rare, yet, in certain cases, these results may be hoped for. This is especially the case, I think, with the epithelial cancers of the lower extremity, which follow injury, and for which amputation is performed; with the soot-cancers which are not making quick progress; with the more superficial cancers of the lip. On the other side, according to present experience, such lengthening of life cannot reasonably be hoped for after operations for the epithelial cancers of the tongue, the gums, or other parts in the interior of the mouth.

(2.) In the majority of cases, and even when very little increase of life can be hoped for, the removal of the disease may give great comfort for a time. In general, also, the

* On Diseases of the Testis, p. 535.

greater part of the time that intervenes between the recovery from the operation and the recurrence of the disease may be reckoned as so much added to life; for although we cannot deny a diathesis, or specific constitutional affection, in epithelial cancers, yet it is by the progress and consequences of the local disease that, in the majority of cases, the time of death is determined; so that, while local disease is absent, life may be shortening at scarcely more than the ordinary rate. Of course, in applying such a rule as this may suggest in practice, we must except from it certain cases in which the general health is already very deeply affected, or in which the operation would be perilously extensive.

(3.) The extension of the epithelial cancer to the lymphatic glands is not an insuperable objection to operations. The disease usually remains long limited to the glands which are nearest to its primary seat (p. 445); its complete removal can therefore be usually accomplished; and, although I can cite no instance of very long survival after operation including cancerous glands, yet, on the other side, I can cite none which would prove that the recurrent disease is quicker or more severe after such operations, than it is after those of equal extent in which the glands are not yet diseased.

(4.) The general rule concerning operations in cases of recurrent epithelial cancer may be the same, I think, as for the primary disease. A second operation is, in general, less hopeful than a first, yet not always so; for although the epithelial, like other cancers, usually make progress at an accelerating rate, yet cases are not wanting in which the intervals between successive operations have progressively increased.

I have tabulated 60 cases in which epithelial cancers were removed with the knife. In 3 the operation (amputation at the thigh) was fatal, or accelerated death; in 27 the disease recurred; the remaining 30 are lost sight of, or are still living, and among these are 3 of those 8 patients whom I mentioned (p. 473) as living beyond the average period: in these 3 the disease has not reappeared; but in 2 of the 8 the recurrent disease is still in progress.

Among the 27 cases of recurrence, the secondary disease was in or near the same place eleven times; in the lymphatic glands, eight times; in both, eight times. The periods of recurrence ranged from one to twelve months, and were, on the average, six months, after the operation.

In 20 of the 27 cases the disease after recurrence was allowed to run its course. In the remaining 7 the recurrent cancer was removed, and with these results:—(1.) Cancer of a labium removed after eight months' duration, recurred in two months; it was removed a second time, together with cancerous glands, and the patient remained well for fourteen months; then fatal recurrence ensued. (2.) Cancer of a labium was removed after thirty-six months' duration; thrice after this the disease reappeared in or near the same part, and was removed after intervals of twelve, three and twenty-four months: the patient has already survived the last operation twenty-eight months; and, though the disease has again recurred, it makes slow progress. (3.) Cancer of the lip, of forty-eight months' duration, recurred in the cheek after three operations, with intervals of six, three, and four months; and the patient is now dying at a distance of eight months from the last operation. (3.) A cancer of three months' duration was removed from the nose; a new growth appeared near the scar a month after the operation; it was removed with *potassa fusa*, and the patient has remained well for six months. (5.) A cancer of the lip of four months' duration was removed; in a month disease reappeared; this also was removed, and the patient had no recurrence in the following six years. (6.) In a similar case recurrence ensued in two months; but the patient remained well for at least twelve months after the second operation. (7.) A cancer of the scalp was removed after eighteen months' duration; it recurred in six months, and was again removed, and there was no reappearance of it in the next eighteen months.

These, and similar cases referred to by M. Lebert, are enough to show that repeated operations may be, in certain instances of epithelial cancer, fully justified. And perhaps we may gather from them an additional motive for very free excision of the cancers; for the excision of a recurrent disease, undertaken as a nearly desperate measure, is generally more free than the first operation was; and thence, it may be, its occasionally greater success.

Let me now collect from the facts of this lecture the grounds which seem to justify the inclusion of this disease under the name of cancer. It is not unimportant to do so; for we may be certain that, in this case, the name of the disease will often guide the further study and the treatment of it.

I have excluded from the group of epithelial cancers the rodent ulcers, which M. Lebert includes with them under the name of "cancroid." The two diseases are so constantly unlike, in both structure and history (see p. 452), that their separation under different titles seems consistent with the most usual rules of nosology. I have also excluded those papillary and other affections of the skin, in which epidermoid structures are accumulated only on the surface of the affected part. For, although these may sometimes appear like the first stages of certain epithelial cancers (see pp. 421 and 465), yet the distinction between the two is commonly well-marked in the history of each case: and, in their respective anatomical relations, the distinction between a superficial and an interstitial epidermoid structure is very significant; since the former has its nearest homologue in natural epithelia, the latter in cancerous infiltrations.

Thus limiting the diseases to be included under it, the name of epithelial cancers seems justified by their conformity with the scirrhous and medullary cancers in these following respects:—

(1.) The interstitial formation of structures like those of epithelium is not an imitation of any natural tissue; it constitutes an heterologous structure; for superficial position is more essential to the type of epithelial structures, than any shape of elemental cells or scales is.

(2.) Even that delusive appearance of homology, which exists when the structures like those of epithelium are formed in the dermal tissues, and therefore near the surface, is lost in nearly all the cases of deep-seated epithelial cancers, and in all the similar affections of the lymphatic glands and internal organs.

(3.) The interstitial formation of cells in epithelial cancer is conformed with the characteristic plan of all cancerous infiltrations, and leads to a similar substitution of new structures in the place of the original tissues of the affected part.

(4.) The interstitially formed cells often deviate very widely from the type of any natural epithelial cell, in shape, in general aspect, in method of arrangement, and in endogenous formation (p. 437, e. s.) The difference between them and any natural elemental structures is, indeed, much greater than that between many medullary and scirrhous cancer-cells and the cells of the organ in which they grow: *e. g.* it is sometimes difficult to distinguish the cells of a medullary cancer in the liver from those of the liver itself.

(5.) The pathology of epithelial cancers is scarcely less conformed than is their anatomy to the type represented by the scirrhous and medullary cancers; for, not only are they prone to incurable ulceration, and to repeated recurrence after removal, but (which is much more characteristic) they usually lead to the formation of structures like themselves in the lymphatic glands connected with their primary seat, and they lead sometimes to similar formations in more distant organs (p. 445, e. s.)

(6.) In their growth, and in their recurrence, there is no tissue which the epithelial cancers do not invade and detroy (pp. 425 and 434).

(7.) A peculiar liability to them seems to exist in certain members of those families in which scirrhous or medullary cancers also occur (p. 460).

Such are the affinities between the epithelial and (as I would say) the other cancers. They are so numerous and so close, that I cannot but think we should be guided in the choice of a name by them, rather than by any other consideration. They are surely more significant of affinity with the other cancers, than the contrast between the shapes of the elemental-cells is indicative of such difference as should be expressed by a different generic name.

LECTURE XIII.

MELANOID, HÆMATOID, OSTEOID, VILLOUS, AND COLLOID CANCERS.

Of the three chief forms of cancer which I have now described, we may observe, I think, that though two of them may be mixed in one mass, or may occur at different times in the same person, or in different members of the same family, and though there are forms intermediate and transitional between them, yet a mass of one of them does not, by any transformation, assume the characters of another. A scirrhous cancer, I think, never itself becomes medullary or epithelial; neither does the converse happen; nor do we see any indication that interference with the development of a cancer of either of these forms would lead it into the assumption of the characters of another. Combination, coincidence, succession, or interchange of these three forms may be found; but, I believe, no transformation of a growth completed or in progress.

If this be true, it indicates that the degree of difference between each two of these three forms is greater than that which exists between them and the cancers to which I shall devote this lecture. For there seems sufficient reason to believe that, by certain generally recognised processes of degeneration or disease, a medullary or epithelial cancer may become melanoid, or hæmatoid; that a scirrhous or firm medullary cancer may become osteoid; that the colloid character may be, in some measure, assumed by either of the three chief forms; and that either of them may observe the villous or dendritic mode of growth. It need not always be supposed that, in the transformations here implied, the cancer-structures already perfected change their characters. It is probable, indeed, that such changes do occur in some of the instances we have to consider; but, in others, we may rather believe that the peculiarities of structure are due to something which induces degeneration or disease in the cancer-elements in their most rudimental state.

The belief that the five forms of cancer, whose names head this lecture, are modifications or varieties of one or more of the three already described, may justify my describing them more briefly, and, in many parts, by terms of comparison with the chief forms. Or, if this belief be not a good reason for such a course, it must be sufficient, that the examples of all these five forms are so rare, that complete and independent histories of them cannot, at present, be written.

It is, I think, probable that other groups of cancers besides these might be conveniently described as varieties of the principal kinds;* but, at present, it seems better to defer the introduction of new names till we have attained more accurate knowledge.

* This may be the case with what Müller named Carcinoma fasciculatum seu hyalinum. But, judging from his description and Schuh's, I cannot tell whether it is a disease which I have not yet seen, or whether (as I am more inclined to believe) the name has not been applied to some specimens of the soft, flickering, mammary or parotid glandular tumours, or to the mammary proliferous cysts that are prone to recur (see pp. 76, 253).

MELANOID CANCER.

The Melanotic or Melanoid Cancers are, with very rare exceptions, medullary cancers modified by the formation of black pigment in their elemental structures. On this long-disputed point there can, I think, be no reasonable doubt. I have referred to a case of melanotic epithelial cancer (page 443): but with this exception, I have not seen or read of any example of melanosis or melanotic tumour in the human subject, which might not be regarded as a medullary cancer with black pigment. In the horse and dog, I believe, black tumours occur which have no cancerous character; but none such are recorded in human pathology. The conditions, which some have classed under the name "spurious melanosis," are blackenings of various structures, whose only common character is that they are not tumours.

Melanotic cancers may have the general characters of any of the varieties of the medullary cancer; but the primary growths are rarely either very firm or very soft. They may appear as infiltrations; but are more often, I think, separable masses. Their characteristic pigment marks them with various shades of iron-grey or brown, deepening into deepest blackness. The pigment is variously arranged in them. Sometimes, we see, on the cut surface, a generally diffused brownish tint, derived from thickly sprinkled minute dots: sometimes, a whole mass is uniformly black: sometimes, one or more deep black spots appear in the midst of a pure white brain-like mass: sometimes, (as in the specimen here figured) in half a tumour there are various shades of brown and black, in the other half the same texture uncoloured: sometimes a whole mass is, as it were, delicately painted or mapped as with Chinese ink. There are thus to be found, in melanoid cancers, all plans and all degrees of black-ening; and these diversities may be seen even in different parts of the same tumour, or in different tumours in the same person.† Nay, even in cancers that look colourless to the naked eye, I have found, with the microscope, single cells or nuclei having the true melanotic characters. And both the general and the microscopic aspect of the disease may be yet farther diversified by the coincidence of degenerations or hæmorrhages, producing, in the unblackened parts of the tumours, various shades of yellow, or of blood-colour.

FIG. 63.*

In the dark turbid creamy or pasty fluid that may be pressed from melanotic cancers, the greater part of the microscopic structures are such as might belong to an uncoloured medullary cancer. It is often remarkable by how small a proportion of pigment the deepest black colour may be given to the mass: a hundredth part of the constituent

* Fig. 63. Section of a variously shaded melanoid cancer formed beneath a mole or pigmentary nævus. Museum of St. Bartholomew's. Natural size.

† All these varieties are illustrated in the Museums of the College and St. Bartholomew's, by specimens referred to in the Indices of the Catalogues, Vol. i. p. 133, and Vol. i. p. xiv.

structures may suffice. The pigment is generally in granules or molecules: but it is sometimes in nuclei or in corpuscles like them.

The majority of the pigment-granules are minute particles, not much unlike those of the pigment-cells of the choroid membrane. When out of focus, they appear black or deep brown; but, when in focus, they have pellucid centres, with broad black borders. They appear spherical; and usually the majority of them are free, *i. e.*, not enclosed in cells, and vibrate with molecular movement in the fluid that suspends them. The greater part of the colour depends on these free granules (fig. 64); but others like them are enclosed in the cancer-cells, or, more rarely, in nuclei. Sometimes those in the cells are clustered round the nucleus; sometimes they are irregularly scattered; in either case they appear as if gradually increasing till they fill the cell, and change it into a granule-mass, which, but for its colour, we might exactly compare with the granule-masses of fatty degeneration. While the pigment granules are thus collecting, the nucleus remains clear; but at last, when the cell appears like a granule-mass, it is lost sight

FIG. 64.*

of. After this, moreover, the masses formed of pigment-granules may break up, and add their granules to those

* Fig. 64. Elemental structures of melanoid cancer, referred-to in the text. Magnified 350 times.

which we may suppose to have been free from their first formation. The completely melanotic cells and their corpuscles, seen singly in the microscope, look not black, but rusty brown or pale umber-brown: like blood-cells, it is only when amassed that they give the full tint of colour.

With the melanotic granules, there is sometimes a much smaller number of particles of the same colour, and the same apparently simple structure, but of larger size: from $\frac{1}{5000}$ to $\frac{1}{3000}$ of an inch in diameter. These may be both free and in cells; in the latter case, lying mingled with melanotic granules in the contents of the cell. More rarely, corpuscles like the nuclei of cancer-cells, preserving their shape, size, and apparent texture, present the characteristic brown tint. Such corpuscles may be free; but they may also occupy the place of nuclei in cells, whose other contents are either uncoloured or mixed with pigment-granules: and more rarely, a single corpuscle of the same kind may be seen in a cell containing an ordinary colourless nucleus.

In all the main facts of their pathological history, the melanotic cancers are in close conformity with the medullary: and this may be reckoned among the evidences that there is much less difference between these two forms than there is between the medullary cancers and either the scirrhous or the epithelial.

In the tables of 365 cases of cancer from which those in the foregoing lectures were derived, there are 25 cases of melanoid cancer. Seventeen of the patients were females, 8 were males. In 14 cases, the primary seat of the disease was in the skin or subcutaneous tissue; in 9, in the eye or orbit; in 1, in the testicle; in 1, in the vagina.* In this

* I once saw primary melanotic cancer of the liver; but I have no complete record of the case.

limitation to a few primary seats, and in its proneness to affect certain abnormal parts of the skin, are the chief peculiarities of this variety of cancer; but on the other points which may be settled by counting, I might have added the 25 cases to those of ordinary medullary cancer, without disturbing the results stated in Lecture XI.

Thus, the ages of the patients at the access of the cancer were as follows:—

Under	10	years	2
Between	10 and 20	,,	1
,,	20 and 30	,,	7
,,	30 and 40	,,	4
,,	40 and 50	,,	5
,,	50 and 60	,,	4
Above	60	,,	2

The only notable difference in this table, when compared with that at page 389, is in the inferior proportion of cases before 20 years of age; a difference mainly determined by the large number of cases of uncoloured medullary cancer of the eye in children.

Among 10 patients with melanoid cancer, one had had a relative who died with cancer of the breast; another had many relatives with pigmentary nævi like that in which her own cancer originated.

In 20 of the cases, the previous history of the affected part is recorded. In 3 of those in which the eye was affected it had been morbidly changed by previous inflammatory disease; in 2 it had appeared healthy. Among the 14 cases affecting the skin or subcutaneous tissue, one patient assigned no local cause; 2 referred to injury, and were uncertain of the previous condition of the skin; in 10 the disease commenced beneath a congenital pigmentary nævus, or dark mole; and in 1, in what the patient called a wart of several years' standing. I shall presently revert to these facts.

In regard to their rate and method of growth, their ulceration, and their multiplying in parts near and distant from their primary seat, I believe the general history of the melanotic cancers is parallel with that of the medullary given in a former lecture (p. 393, e. s.) But they present even a greater tendency to multiply in the subcutaneous tissue, growing here in vast numbers of small soft tubercles.

In like manner, the duration of life in melanotic nearly corresponds with that in medullary cancers. In 18 cases, in all of which the primary disease was removed (but in two only partially), the durations of life from the first notice of the cancer were as follows (and the table may be compared with that in p. 407) :—

Between	6 and 12	months in	3	cases
,,	12 and 18	,,	4	,,
,,	24 and 36	,,	5	,,
,,	36 and 48	,,	1	,,
Above 48		,,	5	,,

Among 18 cases, whose history is known for some time after the removal of the primary disease, one has survived for three years, another for ten months, without recurrence of the disease. In the rest the disease recurred at the following periods (compare p. 408) —

Between	1 and 3	months	in 7	cases
,,	3 and 6	,,	in 4	,,
,,	6 and 12	,,	in 2	,,
,,	12 and 24	,,	in 2	,,
,,	24 and 36	,,	in 1	,,

Seeing this close correspondence in their general pathology, the rules respecting operations for melanoid cancers must be the same as for the medullary. (See p. 409.)

I have reserved for separate consideration some of the peculiarities of melanoid cancers. Three things in them especially deserve reflection, namely—(1) their colour; (2) their proneness to take their first seat in or near cutaneous moles; (3) their profuse multiplication.

1. The colour of the melanoid cancers is due to a pigment-formation, corresponding with that which we find, in the normal state, in the pigment-cells on the choroid membrane, and in the rete mucosum of coloured skins. Their usual primary occurrence near these seats of natural pigments may, therefore, be regarded as an illustration of the tendency of cancers to conformity, at least sometimes and in some respects, with the characters of the adjacent natural textures.

But another meaning of the pigment in melanotic cancers is suggested by its likeness to that which accumulates in the lungs and bronchial glands in advancing years, and in the darkening cuticle of many old persons. The colouring particles are probably different in these cases; they produce different shades or tinges of blackness; but their plans of formation and arrangement are in all similar. And the analogy of their formation in the aged, and in some other instances (vol. i. p. 98), may warrant us in regarding melanosis as a pigmental degeneration of medullary cancer. The chief characters of its minute structures agree with this, especially the gathering of pigment-molecules about the nucleus, their gradually filling the cell-cavity, till, both the nucleus and the cell-wall disappearing, the nucleated cell is transformed into a dark-coloured granule-mass. In all these characters there is an exact parallel betweeen the transformations of the cells in melanoid cancers and the usual changes of the fatty degeneration. (Compare p. 301 and p. 437.)

2. The proneness of melanoid cancers to grow first in or beneath pigmentary moles is very evident: and I am not aware that such moles are peculiarly apt to determine the locality of any other tumours; for, except a case (p. 419) in which an epithelial cancer grew from one, I have met with no instance of other than melanoid cancers connected with them.

The fact is, I suppose, quite inexplicable; but it may be usefully suggestive. It seems a striking illustration of the weakness in resisting disease which belongs to parts congenitally abnormal. It seems, also, to be an evidence that a part may very long remain apt for the growth of cancer, and not become the seat of such a growth, till the cancerous diathesis, the constitutional element of the disease, is established. And this event may be very long delayed: as in a woman, 80 years old, whom I saw with a large melanotic tumour, which had lately grown rapidly under a mole that had been unchanging through her long previous life. But again, this peculiar affinity (if it may be so called) of moles for melanoid cancers, may make us suspect that there may be other, though invisible, defects of first formation in our organs, which may render them, or even small portions of them, peculiarly apt for the seats of malignant and other specific diseases. It is often only the colour that makes us aware of the peculiarity of that piece of a man's skin in which cancer, if it ever occur in him, will be most likely to grow: and yet colour is so unessential a condition of texture, that we may well believe that all the more real conditions of such liability to cancer may be present without peculiarity of colour, though, being without it, the part in which they exist may not be discernible.

I have spoken of the pigmentary moles as becoming the seats of melanotic cancers. It might seem as if the mole were, in some sort, the first stage of the cancer; but it is not so: the structures and the life of the mole are those of natural skin and epidermis, abnormal in quantity and colour, but in no more essential properties: there are no structures in moles like those of cancer, till, at a certain and usually notable time, cancer begins to be formed in them. And here let it be observed, how close is the correspondence in these respects between the pigmentary moles, and the warts that are apt to become the seats of epithelial cancers (p. 464). The patient is usually aware of a time at which a mole, observed as an unchanging mark from birth or infancy, began to grow. In some instances the growth is superficial, and the dark spot acquires a larger area and appears slightly raised by some growth beneath it: in other cases, the mole rises and becomes very prominent or nearly pendulous. I believe that when the mole becomes thus prominent, the chief seat of the cancerous formation is in the superficial layer of the cutis and in the place of the rete mucosum; and that when it only extends itself, the cancerous growth is chiefly in the skin and subcutaneous tissue. In the former case, the cancer-structures are usually infiltrated among the natural structures of the affected part; in the latter, they generally form a distinct tumour, which may be dissected from, though it is closely connected with, the surrounding tissues and the thinned layer of cutis and dark cuticle that covers it. (Fig. 63, p. 484).

The general characters of the growths thus forming correspond, I believe, in every respect with the medullary cancers of the skin and subcutaneous tissue (p. 383).

colour alone distinguishes them; they are equally prone t multiplicity. Often, in removing a deep-set melanotic mass smaller masses are found imbedded in the adjacent fat o other tissue; and sometimes the formation of one or mor subcutaneous growths almost exactly coincides with th outgrowth of the mole and its occupation by the cancer structures.

3. The multiplicity of secondary melanoid formations i often very striking. I have, indeed, seen one case in which to the last, only the lymphatic glands connected with th primary growth were diseased; and another in whic only the liver and some lymphatics were affected; but th more frequent issue of the cases almost literally justifies th expression that the disease is everywhere. Are we to con clude from this that the multiplication of melanoid cancer is more abundant than that of the medullary cancers, whic in other respects they so closely resemble? I think no We can easily see all the secondary melanoid formations even the smallest and least aggregated; and it is often th colour alone that draws attention to many which, but fo it, we should not have noticed. I suspect that equall numerous formations exist in many cases of medullar cancers, but are unseen, being uncoloured.

HÆMATOID CANCER.

This name may perhaps be retained to express a form of cancer which Mr. Hey had chiefly in view when he proposed the name of Fungus Hæmatodes.* It is most probable that all the cases to which he gave this name were soft medullary cancers; and his attention was especially directed to the fact, that when the morbid growth protrudes through the skin, the protruding portion may have such a shape as, in the conventional language of surgery, is called fungous, and often bleeds largely, and is so vascular, or so infiltrated with blood, that it looks like a clot.

The identity of the fungus hæmatodes of Hey with the medullary cancers was fully recognised by Mr. Wardrop and others; but unfortunately, certain foreign writers, regarding the hæmorrhage as the distinctive character of the disease, included under the same term nearly all severely bleeding tumours of whatever kind.† It was an unhappy misuse of Hey's name, by which he meant to express, not a bleeding growth, but one like a clot of blood: and it led to a confusion which is still prevalent.

* Observations in Surgery, p. 239.

† Among the cases thus confused are some strange ones of profuse bleedings from supposed growths, of which little or nothing could be found after death. Such a case is related by Mr. Abernethy (On Tumours, p. 127—note); and a specimen from Mr. Liston's Museum is in the Museum of the College, 302 A. It is perhaps impossible at present to say what these diseases were; but I suspect they were medullary cancers with blood-vessels excessively developed, like those of an erectile tumour..

Leaving the term fungus hæmatodes, we may employ that of hæmatoid cancer, for such as are like clots of blood through the quantity of blood that they contain. The likeness is indeed, I believe, only an accidental one, due to hæmorrhage into the substance of the cancer, from rupture of some of its thin-walled blood-vessels. It seldom exists in the whole mass of a cancer; but, usually, while some parts have the ordinary aspect of medullary or some other form of cancer, other parts are blood-like. The best illustration of the disease that I have seen is in a large tumour,* of which one-half might be taken as a good type of the brain-like medullary cancer, and the other half as an equally good type of the hæmatoid. This half had been deeply punctured during life; it had bled very freely, and the simultaneous bleeding into its own substance had, doubtless, changed it from brain-like to blood-like.

Probably any cancer may thus be made hæmatoid; but the change is peculiarly apt to happen in those which are of the softest texture and most rapid growth, and which are situated where they are least supported by adjacent parts.

* Mus. of St. Bartholomew's, Ser. xxxv. No. 28.

OSTEOID CANCER.

Müller assigned the name of osteoid tumour, or ossifying fungus growth,* to a form of disease of which, with admirable acumen, he collected several cases illustrating these as its distinctive characters;—that the primary tumour consists chiefly of bone, but has, on its surface and in the interstices of its osseous parts, an unossified fibrous constituent as firm as fibrous cartilage; and that, after a time, similar growths ensue in parts distant from the seat of the first-formed, and not on bones alone, but in the cellular tissue, serous membranes, lungs, lymphatics, &c. Mr. Stanley† has described the same disease under the name of Malignant Osseous Tumour; and single examples of it may be found under the names of periosteal exostosis, fibrous osteo-sarcoma, foliated exostosis, &c. Müller was disposed to call it osteoid cancer; and certainly this name is best suited to it, its intimate affinity with the other forms of cancer being evident in these things—(1) its correspondence, in nearly every particular of structure and of history, with the characters of cancerous disease, as exemplified in the scirrhous and medullary forms; (2) its not unfrequent coexistence with medullary cancer of the ordinary kind, either in a single mass of tumour, or in different tumours in the same person; (3) the uninterrupted gradations between it and the scirrhous and medullary cancers; (4) its

* Ueber ossificirende Schwämme oder Osteoid-Geschwülste: (Müller's Archiv, 1843, p. 396.

† On Diseases of the Bones, p. 163.

mutations with the same, in hereditary transmission or in secondary productions. I cannot doubt the propriety of calling a disease cancer, in which these facts can be demonstrated; and I believe that the most probable view of the nature of osteoid cancers would be expressed by calling them ossified fibrous or medullary cancers, and by regarding them as illustrating a calcareous or osseous degeneration. (See p. 321-3, and compare vol. i. p. 101.)

The primary seat of osteoid cancer is usually some bone; but it is not limited to bones. In a case by Pott,* quoted by Müller, the primary tumour lay "loose between the sartorius and vastus internus muscles." In the Museum of St. Thomas's Hospital there is a tumour like an osteoid cancer, which was removed from near a humerus, and another from a popliteal space. In all these cases, the removal of the tumour was followed by the growth of medullary cancers with little or no bone in them.

Among the bones, the lower part of the femur is, with remarkable predominance, the most frequent seat of osteoid cancer. Among 25 cases, of which I have seen histories or specimens, 13 had this part for their seat: the skull, tibia, humerus, ilium, and fibula, were each affected in two cases, and the ulna and metacarpus each in one case.

In most cases, the osteoid growth occurs coincidently within and on the exterior of the bone, following herein the usual rule of medullary cancers; but it may exist on the exterior alone: and I have twice seen its fibrous basis in the cancellous tissue of a bone, of which the exterior was surrounded with soft medullary cancer.

* Works, by Earle, iii. 313. I think that No. 2429 A in the College Museum may be regarded as an osteoid cancer of the testicle, though the bone-like substance has not the characters of perfect bone.

In the best examples of osteoid cancer, *i. e.* in those in which its peculiar characters are most marked, it presents, if seated on a long bone, such as the femur, an elongated oval form; if on a flat bone, a biconvex form. Its elongated shape on the femur, the swelling gradually rising as we trace down the shaft, and then rather less gradually subsiding at the borders of the condyles, is almost enough for a diagnosis of the osteoid cancer from other hard tumours. It is like the enlargement produced by simple thickening of the bone or periosteum: a likeness which is increased by the smoothness of surface, the nearly incompressible hardness, and the considerable pain, which, in general, all these swellings alike present.

When we dissect down to an osteoid cancer (taking one on the femur for a type) we usually find the adjacent tissues healthy, except in being stretched round the swelling. Small masses of firm cancer may, however, be imbedded in them, distinct from, but clustered round, the chief mass. The periosteum is usually continued over the cancer, but scarcely separable from it. The surface is smooth, or very lowly and broadly tuberous. A section generally shows that the exterior of the growth is composed of a very firm, but not osseous, substance; while its interior part, *i. e.* that which lies nearest to the shaft, and that which is in the place of the cancellous tissue, are partially or wholly osseous. The two substances are closely interblended where they meet; and their relative proportions differ much in different specimens, according to the progress already made by ossification.

The unossified part of the tumour is usually exceedingly dense, firm, and tough, and may be incompressibly hard; its cut surface uprises like that of an intervertebral fibrous cartilage, or that of one of the toughest fibrous tumours of the uterus. It is pale, greyish, or with a slight yellow or pink tint, marked with irregular short bars of a clearer white; rarely intersected as if lobed, but sometimes appearing banded with fibres set vertically on the bone.

The bony part of the tumour, when cleared by maceration, has characters altogether peculiar (fig. 65). In the central parts it is (in the best-marked specimens) extremely compact, scarcely showing even any pores, white, and dry. To cut, it is nearly as hard as ivory, yet, like hard chalk, it may be rubbed or scraped into fine dry powder. At its periphery it is arranged in a knobbed and tuberous form, the knobs being often formed of close thin grey or white lamellæ, whose presenting edges give them a fibrous look, exactly like that of pumice-stone. In this part, also, the bone is very brittle, flaky, and pulverulent.

Fig. 65.*

In some specimens, the whole of the bone has this delicate lamellar and brittle texture; but more generally, as I have said, the central part is very hard, and this, occupying the walls and cancellous tissue of the shaft, equally with the surrounding part of the tumour, makes of the whole such a compact white chalky mass as the sketch here represents (fig. 65).

In the osteoid cancers of the lymphatic glands (fig. 66), and other soft parts, the bone is finely porous, spongy or reticulated; or it may be

* Fig. 65. Section of the osseous part of an osteoid cancer of the femur. Museum of St. Bartholomew's, Ser. i. 109.

finely lamellar, and look fibrous on its surface. It is always soft and brittle, and, often, it has in these parts no regular plan, but is placed in small close-set grains or spicules, which fall apart in maceration. In whatever plan or part the bone is found, it has no medulla; its interstices are filled with cancer-substance.

Fig. 66.*

When the salts of lime are removed from the bone with acid, an organic basis-substance remains, which presents the same general aspect as the unossified part of the cancer, while retaining the lamellar and fibrous arrangement of the bone.† This basis yields gelatine; and the saline constituents are similar to those of ordinary bone, but with a disproportionate preponderance of phosphate of lime (Müller, l. c. p. 412).

With the microscope, the unossified part of an osteoid cancer appears fasciculated or banded, and is always very difficult to dissect. In some specimens, or in some parts, it has only a fibrous appearance, due to markings and wrinkles of a nearly homogeneous substance, in which abundant nuclei appear when acetic acid is added. In others, it is distinctly fibrous, but not in all parts with the same plan. The fibres are sometimes moderately broad, about $\frac{1}{3000}$ of an inch wide, have uneven, thorny edges, and, arranged in bundles, look like faggots (fig. 67, A). In other parts they are finer,

* Fig. 66. Section of an inguinal lymphatic gland, with osteoid cancer, after maceration: Nat. size. Mus. of St. Bartholomew's, Ser. i. No. 109.

† Mus. Coll. Surg. No. 809.

like sharp-edged, crisp, and stiff filaments. Such as these

Fig. 67.*

may present a nearly regular reticular arrangement, with well-formed meshes (B); or they may be nearly parallel, and construct a more distinctly fibrous texture (C); or they may be closely matted and, except in their exceeding toughness, may be like the short, crooked filaments of a fibrine-clot (D). I never saw them presenting the undulating glistening aspect of the filaments of an ordinary fibrous tumour, or of natural fibrous tissue.

Fibrous tissue, in one or other of the forms just mentioned, makes up the main mass of the unossified part of the cancer. But other elemental forms usually exist with it. Sometimes cancer-cells are mingled with it, as if imbedded in the interstices of the fibres. They are of ordinary form, not differing from those of common scirrhous cancers in anything, unless it be in that they are smaller and less plump. Sometimes granule-masses and minute oil-molecules are scattered among the fibres. Both these and the cancer-cells appear foreign to the fibrous tissue, as mingled with it, not part of it; but, if acetic acid be freely added, the fibrous tissue becomes clearer, and we find (what may before have been very obscurely seen) abundant nuclei

* Fig. 67. Fibrous tissue of osteoid cancer in different forms, as described in the text. Magnified 400 times.

bedded in it. They are generally oval, smooth, well-ined, from $\frac{1}{2000}$ to $\frac{1}{3500}$ of an inch in length; but, I k, as the fibrous tissue becomes more perfect, they vel and become crooked, or like little stellate cracks in basis-substance; or else that, as it ossifies, they are edded in the accumulating lime-salts, and become the næ of the bone.*

tructures such as these exist in the osteoid cancers of parts; and when a series of those occurring in the lymphatics and other organs can be compared with the primary disease on a bone (for example), I believe no other difference will be found, than that the secondary cancers are less definitely fibrous, and have a larger proportion of cancer-cells or granule-masses, than the primary disease. These, however, are no greater differences than may be found in comparing the less with the more firm parts of a single primary mass of the disease.

The microscopic characters of the ossified part of the cancer are those of true bone, but rarely of well-formed bone. In some parts—especially in the secondary cancers—that which appears to be bone is only an amorphous granular deposit of lime-salts, like those in ordinary calcareous degenerations. In other parts the lacunæ of true bone are distinct, but they are small, and their canalicules are few and short, and without order. Haversian canals also exist with these, but they have not a large series of concentric lamellæ like those in normal bone. In other instances, but these are rare, the lacunæ are more nearly perfect; their canalicules communicate with one another, and with the cavities of the Haversian canals. The bone with distinct lacunæ and canalicules is not found exclusively in the

* Gerlach also describes this in his Essay, Der Zottenkrebs und das Osteoid, p. 52.

primary cancer, or near the natural bone on which it is seated: here, indeed, the complete bone is most frequent; but it may be found, also, in the secondary growths in the glands and elsewhere. These differences between the bone of the primary and that of the secondary osteoid cancers, like the similar differences of their unossified parts, are only differences of degree, such as may be found in separate parts of the same mass; they are, probably, to be ascribed only to more recent or more rapid growth.

The foregoing description of the osteoid cancers may suffice to show that their nearest affinities, judging by the structure of their unossified part, are to the fibrous cancers, of which I spoke at p. 321, and to the firmest of the medullary cancers (p. 365). When abundant cancer-cells are present they most nearly resemble the latter form; when they are almost wholly fibrous, the former. Their peculiarity, as cancers, is in their ossification. In this they may seem to approximate to the non-cancerous tumours; but, really, they remain, even when ossified, very distinct from any of them. I have enumerated (p. 246) the characters by which they are distinguished from both the hard and the cancellous osseous tumours; and the difference is as complete and, I believe, as constant, as that of their fibrous basis is from the structure of any non-cancerous fibrous tumour.

If we consider only their osseous part, the osteoid cancers most nearly resemble those soft medullary cancers which have the most abundant internal skeletons. There is, indeed, no absolute line of distinction to be drawn between the two. It may be very evident, in the typical specimens of each, that the skeleton of the soft medullary cancer is formed by ossification of the intersecting and overgrown infiltrated periosteum (p. 363); and that the bone of the osteoid cancer is formed by ossification of the proper cancerous substance; but, between these extremes or types, there are numerous instances in which the two conditions are mingled, or through which the one condition merges into the other. And this is no more than we might expect, seeing the frequency with which the osteoid and the medullary disease appear together, or in succession.

The materials for a general pathology of osteoid cancers are very scanty; yet one may be written; for if we collect only well-marked examples of the disease, their histories will be found consistent with one another, and distinct from those of the other groups of cancers.

Among 20 cases, 15 occurred in men, and 5 in women: a preponderance on the male side approximating that observed in epithelial cancers, and (if we may trust to a result from so few cases) contrasting, in a striking manner, with the distribution of medullary and scirrhous cancers.

Among 19 of these patients, 5 were between 10 and 20 years old; 9 between 20 and 30; 4 between 30 and 40; 1 between 40 and 50:—proportions which again do not correspond with those in any other form of cancer.

Among 13 of the patients, 5 distinctly referred to injury as the origin of the cancer, and 2 to previous disease in the part: the others assigned no cause.

The growth of osteoid cancers is generally rapid, and accompanied with severe pain in and about their seat; their multiplication in the lymphatics and in distant parts takes place with proportionate rapidity; and intense cachexia occurs early in their course. There are exceptions to these things; but in all these respects the majority of the osteoid cancers appear as malignant as the medullary, and are as quickly fatal.

Among 14 cases, of which the ends are recorded, 3 died in consequence of amputations. Of the other 11, 4 underwent no operation, and all died in or within six months from the first notice of the disease. Of the remaining 7, in all of whom the disease was once or more removed, and in all of whom it recurred before death, 2 died in the first year of its existence, 1 in the second, 1 in the third; but one lived for 7½ years, another for 24, and another for 25 years.

In all the instances of speedy death, secondary osteoid cancers existed, and the result was probably to be assigned to these and to the coincident cancerous cachexia; for the primary growths have little tendency to ulcerate or protrude, and they seem to contribute directly to death by their pain alone. In the instances of life extended beyond twenty years, the disease appeared to recur only near its primary seat.

The most frequent seats of the secondary, or recurrent, osteoid cancers are the lymphatic glands, in the line from the primary seat to the thoracic duct, the lungs, and the serous membranes: but it is not limited to these; it may be found even in the blood-vessels, as in a case which I shall relate, and has been traced in the thoracic duct.* Its condition in these secondary seats need not be described: in structure it resembles in them the primary disease, with only such differences as are already mentioned; in plan it is like the growths or infiltrations of secondary medullary cancers in the same parts. But it is to be observed that, sometimes, the secondary cancer is medullary, without osseous matter. I have mentioned three instances of this (p. 496), and Professor Langenbeck told me that he once removed an upper jaw with a bony growth, and the patient died soon after with well-marked medullary cancer in the lungs. The reverse may occur: for the same distinguished surgeon told me that he once removed a humerus with a

* Cheston, in Philos. Trans. 1780, vol. lxx.

Case of [illegible] Cancer [illegible] by me at Hotel Dieu medullary cancer, and the patient died with osseous tumours in the lungs.

The ordinary course of osteoid cancers may be known by the foregoing account of them, and by the cases recorded by Müller and Mr. Stanley.* But deviations from this course are sometimes observed, which it may be well to illustrate by cases that displayed the disease in an unusually acute, and an equally unusual inactive, form.

A girl, 15 years old, was admitted into St. Bartholomew's Hospital, with general feebleness and pains in her limbs, which had existed for two or three weeks. They had been ascribed to delayed menstruation, till the pain, becoming more severe, seemed to be concentrated about the lower part of the back and the left hip. A hard deep-seated tumour was now felt, connected with the ala of the left ilium. This gradually increased, with constant and more wearing pain; it extended towards the pelvic and abdominal cavities; the patient became rapidly weaker and thinner; the left leg swelled; sloughing ensued over the right hip; and thus she died cachectic and exhausted, only 3½ months from her first notice of the swelling.

A hard lobulated mass was found completely filling the cavity of the pelvis, and extending across the lower part of the abdominal cavity. It was firmly connected with the sacrum, both ischia, and the left ilium; it held, as in one mass, all the pelvic organs; and the uterus was so imbedded in it, and so infiltrated with a similar material, that it could scarcely be recognised.

The general surface of this growth was unequal and nodular. It was composed of a pearly-white and exceedingly hard structure, in which points of yellow bony substance

* L. c. See also Gerlach's two cases (l. c.) and that by Hunter, in the Catalogue of the College-Museum, vol. ii. p. 176.

were imbedded, and which had the characters of osteoid cancer perfectly marked. The ilium, where the tumour was connected with it, had the same half fibrous and half bony structure as the tumour itself.

The common iliac veins, their main divisions, and others leading into them, passed through the tumour, and were all distended with hard substance like the mass around them. From the common iliac veins a continuous growth of the same substance extended into the inferior cava, which, for nearly five inches, was distended and completely obstructed by a cylindriform mass of similar fibrous and osseous substance, 1¼ inches in diameter. At its upper part this mass tapering came to an end near the liver.

The lower lobe of the right lung was hollowed-out into a large sac, containing greenish pus and traversed by hard coral-like bands, which proved to be branches of the pulmonary artery plugged with firm white substance intermingled with softer cancerous matter, and resembling the great mass of disease in the pelvis. The rest of the lung was healthy, with the exception of some scattered greyish tubercles; and so was the left lung, except in that there were a few small abscesses near its surface, with hard, bone-like masses in their centres, like those in the branches of the right pulmonary artery. The skull, brain, pericardium, heart, and all the abdominal organs, were healthy.*

I suppose that few cases of osteoid cancer can be found equal with this in the acuteness of their progress. The opposite extreme is illustrated by a case communicated to me by Mr. Thomas Sympson, and exactly corresponding with one of which the specimens are in the Museum of the College.† A swelling appeared in the upper arm of a

* The specimens from this case are in the Museum of St. Bartholomew's.

† No. 3244-5-5 A.

woman 32 years old. After ten years' growth, when it had increased to seven pounds weight, it was removed by Mr. Hewson. It had the characters of osteoid cancer. The patient completely recovered from the operation ; but, about a year after it, a new tumour appeared about the humerus, and at the end of four years had acquired a huge size, and a weight of 15½ pounds. For this, which proved to be a similar osteoid growth, the arm was amputated at the shoulder-joint. She recovered from this operation also ; but the disease returned in the scapula, and, in about 10 years after the amputation, and 24 years from the beginning of the disease, she died.

VILLOUS CANCER.

Villous Cancers (Zottenkrebs of Rokitansky),* are varieties of Medullary, and, perhaps, in some instances, of Epithelial Cancers; but they demand a separate description, not for their own sake alone, but because they illustrate a remarkable mode of growth, which probably prevails in a much wider range of morbid structures than it is yet clearly traced in.

Among the best examples of the villous cancer are those which occur on the mucous membrane of the urinary bladder, and of which an excellent specimen, in the Museum of the College, is represented in the adjacent sketch. Here the cancer appears of oval or spheroidal shape, attached to the mucous membrane by a narrow base, and pendulous in the cavity of the bladder. Its base and central part may be solid, either mo-

FIG. 68.†

* Ueber den Zottenkrebs, in the Sitzungsberichte der kais. Akademie; April, 1852.

† Villous cancer of the urinary bladder, half the natural size.

derately firm, or soft, like an ordinary medullary cancer, yielding abundant creamy fluid; but all its unattached and peripheral part is very soft, tufted, shreddy, and flocculent, like the surface of a chorion. It is covered with fine villous processes that float out in water, and are usually bright or dark red, with the full blood-vessels which they contain, and from which, during life, profuse hæmorrhages are apt to occur. Two or more such cancerous growths may stand near together; or there may be, according to Rokitansky, a collection of delicate, spongy, and branched villous excrescences, rising from a circumscribed base; or a diffuse growth of numerous single tufts scattered over a wider extent. Commonly, the surrounding mucous membrane appears reticulated with a fine-meshed trellis-work, from the bars of which very delicate excrescences rise, in the form of fine vesicles or villi.*

Growths, such as these are on the mucous membrane of the bladder (their most frequent seat), may occur in many other parts. Rokitansky describes them in the stomach, the rectum, the gall-bladder,† the interior of ovarian cysts, on the peritoneum,‡ and the dura mater. In all these positions

The specimen is No. 2005 in the College Museum: the figure 68 is copied from that by Clift in Sir E. Home's "Observations on the Prostate Gland," vol. ii. p. 49, pl. x. No. 2006 in the College Museum, and Nos. 2, 7, and 25, in Ser. xxvii. in the Museum of St. Bartholomew's, are similar specimens.

* So in the mucous membrane of a cancerous stomach in the Museum of St. Bartholomew's, xv. 5. Gerlach rightly dwells on this state, and the smaller tufts that surround the main disease, as constituting a preparatory villous or papillary, but not yet cancerous, state. The case is parallel with that of the warty growths that may precede and become the seats of epithelial cancer.

† Museum of St. Bartholomew's, xix. 3.

‡ An exquisite specimen of this is in the Museum of St. Bartholomew's, xvi. 60.

the cancer projects into cavities, and finds, probably, the most favourable conditions for its characteristic method of growth; but Rokitansky has also observed similar growths in the brain, the liver, and the uterus; in the last-named organ growing first in its very substance, and thence protruding into its cavity.

I have had no opportunity for many years past of minutely examining well-marked villous cancers. I will therefore describe their construction in an abstract of Rokitansky's Essay.

The excrescence consists, in its stem, of a fibroid membranous structure, on which the branches and villous flocculi are borne, as larger and smaller pouch-like and flask-shaped buddings, or sproutings of a structureless hollow tissue.

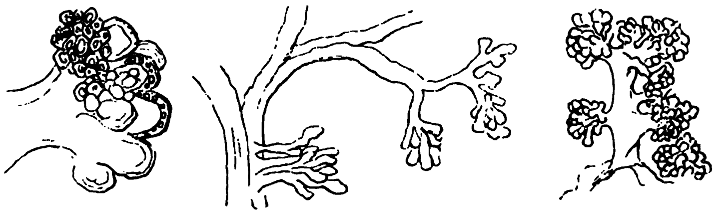
The "dendritic vegetation," of which these sproutings are an example, has been already often referred to, especially in the account of the stroma of medullary cancers* (p. 375), which stroma is, indeed, only another modification of the same plan of growth as the villous cancers exemplify in a clearer form. Other examples are in the endogenous growths of cysts; in the Lipoma arborescens of Müller (*i. e.* the tufted and villous growths on synovial membranes; and in

* The following pages contain the fuller truth of what is said in a note at p. 64, which was printed before I received the two essays by Rokitansky that are cited here and at p. 375. The same views which these essays expound were stated by him in those published in 1849, on Cysts and on Bronchocele, but so much less clearly, that I did not fully see their bearing on the pathology of the endogenous growths in proliferous cysts. The reader must not fail to observe how much of the truth concerning these cancerous growths was expressed by Dr. Hodgkin.

the intracystic growths of thyroid and other gland-substance illustrated in the third Lecture (p. 64, e. s.)

The "dendritic vegetation" appears originally as a hollow-club-shaped or flasked-shaped body, consisting of an hyaline structureless membrane. It is either clear and transparent, or opaque, *i. e.* filled with granules, nuclei, and nucleated cells (fig. 54, p. 376): externally, it is either bare or covered with epithelium. The vegetation does not usually develope itself into villous growths directly on the mucous or other surface on which it rests, but on the bars of some previously formed meshed-work, such as is described at p. 376 and 509. The further development of the vegetation is commonly in one of two chief plans. Either the membranous flask grows uniformly into a sac, which contains a serous fluid, or is filled with a delicately fibrous meshed-work; or else it grows and sprouts in various degrees and methods. Of

FIG. 69.*



A B C

this sprouting growth, which alone is illustrated in villous cancers, there are three types. They are represented in the adjoining copy of Rokitansky's sketches.

In the first (fig. 69 A), the flask grows out in low, nearly

* Fig. 68. Methods of growth of the "dendritic vegetation," from Rokitansky. Magnified 30 times: explained in the text.

hemispherical sprouts. These may contain serous fluid, as in the cystic disease of the choroid plexuses; or they may be filled with gland-structures, as in the thyroid and mammary intracystic growths; or they may contain and be covered with cancerous structures, as in the instance of the small excrescences within a cyst in a cancerous kidney, from which fig. 69, A, was drawn.

In the second type, (fig. 69, B) the flask grows lengthwise into a tube, and shoots-out new ones, which grow to secondary tubes, and again shoot-out others, which grow to tertiary tubes, and so on. On these outgrowths abundant broader sprouts and buds appear. Thus a multiformly ramified dendritic structure is produced. Its sprouts may be filled with fibro-cellular tissue, or fat (as in Lipoma arborescens), or with cartilage and bone (as in the pendulous growths of these tissues within joints); or they may contain and be covered with the elements of the cancer, as in the villous cancer of the urinary bladder, of which part is sketched in fig. 69, B.

In the third type, illustrated by fig. 69, C, from another villous cancer of the bladder, the flask grows with considerable dilatation into a stem, which gives-off branches that do not ramify further, but break-up at once into a great number of flask-shaped sprouts.

The usual arrangement of the blood-vessels of the dendritic vegetations is that (as in the synovial fringes and the villi of the chorion) a vessel runs along the contour of the vegetation, forming frequent loops, and supplying to the stem, as well as to each of the sprouts and branches, an ascending and a descending vessel. There are, however, pouches in the vegetation in which only a single vessel exists, and terminates with a rounded end. The vessels are generally large, examples of the so-called colossal capillaries, thin-walled with longitudinal, and sometimes also transverse, oval nuclei in pellucid membrane.*

In structure, the vegetation in villous cancers is often hyaline; that is, it contains, besides a clear fluid, no tissue-elements; but it often contains, together with its blood-vessels, a quantity of elementary granules, nuclei, and cells, and, especially at the ends of its sprouts, structureless simple and laminated vesicles. On its exterior, the elements of a medullary or melanotic cancer-juice adhere to it, consisting of nucleated cells of various shapes, which form a soft, or a more consistent, deposit, and are often present in such quantity that they make-up the greater part of the morbid mass, into which then the vegetations seem to grow.

In other cases, a fibrous texture developes itself in the interior of the vegetation, and with it cancerous elements form, like those of the exogenous formation just mentioned. In this state the villous cancer, in consequence of the accumulation of the fibrous and cancerous structures, appears as a collection of excrescences which, in their stems as well as in their branches and sprouts, and especially towards their free ends, are swollen thick and big. They are here filled with a delicately fibrillated meshed-work, turgid with medullary cancer-juice; and, as their swollen ends are often mutually compressed, the whole appears like foliage growing on shorter or longer stems.

When the villous cancer is cut-through to its base, one finds a tolerably abundant porous fibrous texture, which, on nearer examination, presents a compressed meshed-work traversed by fissure-like apertures. Its bars consist of a hyaline substance beset with oblong nuclei and nucleus-

* Gerlach's account of the blood-vessels nearly corresponds with this (Der Zottenkrebs und das Osteoid, Taf. i. fig. 3).

fibres, and here and there dividing into filaments of connective-tissue. The tissue (*e. g.* of the mucous membrane) around the base of the cancer is traversed by a whitish fine-meshed trellis-work, the bars of which consist of nucleated cells, and often develope delicate prominences and vesicles, the beginnings of the kind of vegetation from which the cancer sprang.

The fissured and perforated mesh-work in the interior of the base of the villous cancer corresponds with the stroma of ordinary medullary cancers (p. 376). Both are constructed on the plan of the dendritic vegetation. In the construction of the stroma, the sprouting growths become a meshed-work by partial absorption: in the villi of the villous cancer they lengthen into branching tubes. And these tubes have, on the one hand, the import of a stroma, in that the cancerous elementary structures cover them and fill-up the spaces between them, as they do those between the bars of the more ordinary stroma. But, on the other hand, the tubes have a nearer and distinctive relation to the cancerous elements, in that they produce those elements in their interior; so that there is an endogenous as well as an exogenous production of cancer-structures.

In all the instances that have been fully examined, these structures have been like those of medullary or melanotic cancer. But I believe Rokitansky is right in the anticipation that certain epithelial cancers will be found to grow on the same plan as the villous. I have referred (p. 421) to instances of warty epithelial cancers growing where they could not have had origin in natural papillæ: Virchow also describes arborescent epithelial cancers growing in cavities where no papillæ could well be; and I have seen the same in cysts within what I believe to be an epithelial cancer of the clitoris.* The shapes of the most exube-

* Museum of St. Bartholomew's, xxxii. 39.

rant epithelial cancers so imitate those of the villous cancers, that it seems highly probable that some of them are produced by the dendritic mode of growth, rather than by the enlargement and deformity of papillæ.

The correspondence of the stromal structures, and the exact similarity of the cancer-elements, found in the medullary and melanoid cancers on the one hand, and in the villous cancers on the other, are enough to warrant us in regarding these as varieties of the more general form. This view is confirmed by numerous cases in which the central and basal parts of the growth are like common medullary cancer, its surface being villous; and by some in which villous cancers appear as secondary growths with primary medullary cancers of the more common kind: thus, *e. g.*, the former occur on the peritoneum, with the latter in the ovaries. It may be anticipated that the histories of the villous cancers will equally coincide with those of the medullary and melanotic; but, as yet, the cases recorded are too few for the deduction of any general rules.

COLLOID CANCER.

Many names have been given to this form of cancer—Colloid, Alveolar, Gelatiniform, Cystic, and Gum-Cancer. I have adopted the first, because it seems to be now most frequently used, and expresses very well the most obvious peculiarity of the diseased structure, the greater part of which is, usually, a clear flickering or viscid substance, like soft gelatine.

The most frequent primary seats of colloid cancer are the stomach, the intestinal canal, uterus, mammary gland, and peritoneum: as a secondary disease, it affects most frequently the lymphatic glands and lungs, and may occur in many other parts.

To the naked eye, a colloid cancer presents two chief constituents: an opaque-white, tough, fibrous-looking tissue, which intersects, partitions, and encloses its mass; and a clear soft or nearly liquid material, the proper "colloid" substance. According to the proportions in which these are combined, the general aspect of the disease varies. When the fibrous texture is predominant (as I have twice seen it in the central parts of colloid cancers of the breast) it forms a very tough, white, fascia-like mass, in which are small separate cysts or cavities filled with the colloid substance. In the opposite extreme, large masses of the colloid substance appear only intersected by fibrous white cords or thin membranes, arranged as in areolar tissue, or in a wide-meshed network. These extremes often exist in different parts of the same mass, and with them are various intermediate forms, in which, probably, the essential characters of the disease may be best learned. In these, the cancerous substance appears constructed of small thin-walled cysts, cells, or alveoli, arranged without apparent order, and filled with the transparent colloid substance. The cysts or alveoli are, typically, of round or oval form, but are changed from this, as if by mutual pressure; some may appear closed, but the great majority communicate with those around them, through apertures like imperfections in their walls. They vary from an inch in diameter to a size as small as the naked eye can discern. The largest cysts, and the least abundant fibrous tissue, are usually at or near the surface of the mass; and in these large cysts, when the colloid substance is emptied from them, we can generally see intersecting bands, or incomplete partitions, as if they were formed by the fusion of many cysts of smaller size. The walls of the cysts appear formed of delicate white fibrous tissue, but cannot be separated from the surrounding substance, and are continuous with the coarser bands or layers of fibrous tissue by which the cancerous mass is intersected.

The colloid matter is, in different parts or in different instances, various in consistence; resembling a thin mucilage, starch-paste, the vitreous humour, size-gelatine, or a tenacious mucus. In its most normal state, it is glistening, translucent, and pale-yellowish; but it may be colourless, or may have a light green, grey, pink, or sanguineous tint; and may become opaque, whitish or buff-coloured, by (apparently) a fatty or calcareous degeneration; or, in the extreme of this degeneration, may look like tuberculous matter. In water, or in spirit, it oozes from the alveoli and floats in light cloudy flocculi; and when the surface of the cancer is exposed by ulceration or by rupture, it is discharged from the opened alveoli and lies on them like a layer of mucus.

The colloid cancers have, usually, in the first instance, the shape of the part that they affect; for they are always, I believe, infiltrations of the affected part, whose tissues are gradually removed and superseded by their growth. But the growth of the colloid cancer enlarges and surpasses the part in which it is seated, and produces, in such an organ as the breast or the lymphatic glands, a considerable rounded and tuberous firm swelling, or, in such an one as the stomach or the peritoneum, a flattened expanded mass with more or less of nodular or tuberous projection.

The extent of growth is sometimes enormous, especially in the peritoneum, in which, as in a case related by Dr. Ballard,* the greater part of the parietal and much of the visceral portion may be infiltrated with the morbid structure, either in a nearly uniform layer, or in nodulated swellings formed of groups of cysts, and sometimes projecting far into the peritoneal cavity. The cavity itself may, in these cases, contain free colloid matter, discharged, I suppose, from the open superficial alveoli, and the abdominal walls may be thus distended with a fluctuating vibrating swelling like that of ascites.†

It is not unfrequent to find one or more large and thick-walled cysts near or attached to masses of colloid cancer, and imitating the characters of such proliferous multilocular cysts as are found in the ovaries. They are usually filled with colloid matter, and their likeness to the ovarian cysts

* Med.-Chir. Trans., xxxi. 119.

† In Dr. Ballard's case, six quarts of free colloid matter were removed from the peritoneal cavity after death. I remember an exactly similar case in which, I think, the quantity removed must have been greater, and in which it certainly appeared to be derived from the dehiscence and constant discharge of the alveoli. In the Museum of the College, No. 294, is a mass of peritoneal colloid cancer, from eight to ten inches in its diameters, which was removed from the lower surface of a liver.

may confirm the belief that many of the latter are really colloid cancers of the ovaries.

Moreover, colloid cancer is sometimes found mingled in the same mass with medullary cancer. This is, indeed, frequent in the digestive canal. Villous and melanotic cancers have been similarly combined with it; and, more frequently, in different parts of the same person, the medullary and the colloid are found in distinct masses.

Microscopic examination of fragments of colloid cancer brings into view an arrangement of delicately fibrous and lamellar structures, imitating, in miniature, the larger appearances visible to the naked eye. Fine tough fibres, or fibred membranes, are arranged in curved bundles and lamellæ, which, by their divergences and interlacements, encircle or enclose oval or spherical spaces, containing the colloid substance. The enclosed spaces are seldom complete cavities; they communicate freely with one another; and both in their plan, and in the general aspect of the tissue, remind one, as Lebert says, of the structure of a lung, with its communicating air-cells. The fibres are very fine, but appear stiff and tough, not undulating nor easily parting; they are but little and slowly changed by acetic acid. Elongated nuclei are often seated on these fibres, and sometimes, Lebert says, elastic fibres are

FIG. 70.*

* Fig. 70. Fibrous tissue of a colloid cancer of the breast. Magnified 70 times.

mingled with them. The colloid substance fills all their interspaces, not merely the cavities which they circumscribe, but, as it were, mere crevices between the fibres, and spaces in the walls of the larger cavities.

The colloid substance generally appears, however magnified, clear and structureless; it might be invisible but for the seeming filamentous texture produced, as it often is in spread-out masses, by its folds and creasings. Sometimes, the colloid material is sprinkled with minute dots, like oily or fatty molecules,* which to the naked eye may give it a peculiarly milky or ochrey aspect; and sometimes it is beset with clusters of such molecules, resulting apparently from the degeneration of imbedded nuclei or imperfect cells. With these, also, crystals of the triple phosphate, cholestearine, and some peculiar fatty matter,† may be mingled.

Lebert‡ has published an exact analysis of this colloid matter by Wurtz. The main results are, that it is quite unlike any variety of gelatine, being insoluble in water, and containing only 7 per cent. of nitrogen, a peculiarity which distinguishes it as well from all protein-compounds, and from the materials of which (imperfectly and impurely as they have been examined), the essential structures of other cancers are composed.

Imbedded in the colloid substance, but in very uncertain quantity, are corpuscles of peculiar form. According to Lebert (of whose description and sketches I again gladly avail myself), they are chiefly these:—

(1) Nucleated cells lie free in the colloid substance, or enclosed within large brood-cells, or grouped like an epi-

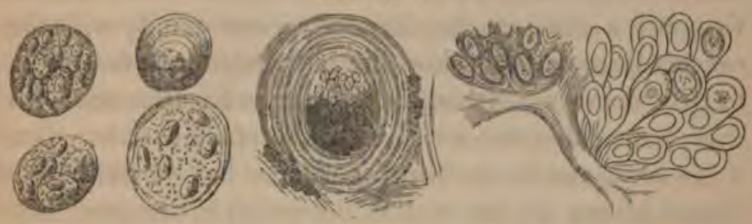
* But the observations of Dr. Jenner (Proc. of Pathol. Soc., 1851-52, p. 323) make it probable that these are granules of phosphate of lime.

† Luschka, in Virchow's Archiv, iv. 412.

‡ In Virchow's Archiv, iv. 203.

thelium on the boundaries of the alveoli or cysts. These, the so-called colloid corpuscles, are small, granular, moderately transparent cells, of irregular shape, from $\frac{1}{5000}$ to $\frac{1}{2000}$ of an inch in diameter, with small nuclei or none.

FIG. 71.*



These are, probably, cancer-cells hindered and modified in their development by the peculiar circumstances of their formation; for, with such as these, more perfect cancer-cells are sometimes found.

(2) Large compound cells, mother-cells or brood-cells, which, in typical specimens (fig. 70, A) are from $\frac{1}{250}$ to $\frac{1}{500}$ of an inch in diameter, are in some instances very numerous. They are very pale, oval, round, or tubular, and lie in clusters: some of them display a lamellar surface, indicated by concentric boundary-lines; and they enclose one large granular nucleus, or several of smaller size imbedded in their general granular contents, or, together with such nuclei, complete nucleated cells like cancer-cells.

(3) Large laminated spaces (fig. 70, B) are also found of nearly crystalline clearness, from $\frac{1}{50}$ to $\frac{1}{100}$ of an inch in diameter. These are usually oval and grouped, so as to form a soft parenchyma. Between the lamellæ of their walls elongated nuclei are scattered; in the interspaces be-

* Fig. 71. Structures of colloid cancer described in the text. From Lebert (Virchow's Archiv, B. iv. Taf. v.) and Rokitansky (Ueber die Cyste, Taf. vi.)

tween them are clusters of small nucleated cells and nuclei; and they enclose brood-cells in the cavities surrounded by their concentric lamellæ.

Whether we consider the larger, or the minuter, characters of this colloid cancer, it seems difficult to believe that such a structure can have any close affinity with the cancers I have already described; they appear, at first sight, to have scarcely anything in common. Hence, some have denied altogether the cancerous nature of this disease. But if we look, not to its structure alone, but as well to its clinical history (so far as it is illustrated by the great majority of the recorded cases), we shall find in it all the distinctive features of the cancers. Thus (1), its seats of election are, remarkably, those in which the medullary cancers are, at the same time of life, most apt to occur; (2) like the typical cancers, the colloid infiltrates, and at length supersedes and replaces, by substitution, the natural tissues of the affected part; (3) like them, also, it is prone to extend and repeat itself in lymphatic glands, the lungs, and other parts near to or distant from its primary seat;* (4) the colloid is often associated with other forms of cancer in the same mass, or in different tumours in the same person; (5) it appears as apt as any other form to recur after removal; (6) it may be derived, hereditarily, from a

* Colloid cancer was thus multiplied in ten out of eleven cases recorded by Lebert. In a case by Dr. Warren (Med.-Chir. Trans., vol. xxvii.), the multiplication was to an amount scarcely surpassed by any medullary cancers. It is true that it is not unfrequently limited to the stomach, or rectum, and the adjacent lymphatic glands; but this is equally observable in the cases of villous and other medullary cancers, and I suspect is only an example of a general rule that cancers (of whatever kind) on exposed surfaces are, on the whole, more apt to remain single than those growing in other parts.

parent having scirrhous cancer, or a parent with colloid may have offspring with medullary cancer.

These facts seem enough to prove the right of including the colloid with the generally received forms of cancer; certainly they are enough, if we can explain the peculiarities of the colloid cancer as the result of any known morbid process in such elemental structures as, in other conditions, might have been conformed to the ordinary types of cancer. And such an explanation is not impossible, for, as Rokitansky shows, the colloid cancer has a near parallel in many cyst-formations in the normal structures, and especially in those forms of bronchocele in which abundant cysts, full of viscid fluid, are formed in the growing thyroid gland. It seems, therefore, a reasonable hypothesis that the peculiarities of the colloid or alveolar cancer are to be ascribed to cystic disease occurring in elemental cancer-structures. Such a cystic disease may ensue in a medullary or other cancer already formed; but in the well-marked and uniformly constructed colloid cancer, it is probable that the deviation to the cystic form ensues in the very earliest period of the cancer-structures, while each element is yet in the nascent or rudimental state.

Such may be the explanation of the structures of those cancers in which the formation of cysts is carried to its maximum; and I have reserved for this place an account of the various combinations of cysts with cancers of all kinds,—combinations giving rise to many singularities of appearance, of which I omitted the description in earlier Lectures, that I might once for all endeavour to explain them.

And first, we may divide these cases into those in which the cysts are formed independently of the cancer-structures, and those in which they are, or appear to be, derived from them.

In the first class we may enumerate many cases in which cysts and cancers are in only accidental proximity. For example, a scirrhous cancer may occupy part of a mammary gland, in the rest of which are many cysts that are in no sense cancerous, or of which the chief lactiferous tubes are dilated into pouches or cysts (see page 289). And such a cancer, in its progress, may enclose these cysts, and they may, I believe, remain for a time imbedded in it. In like manner, the ovary, or any other organ, being already the seat of common cysts, may become the seat of cancer; and the two morbid structures may become connected though not related.

In this class, also, may be reckoned the cases in which cancers grow from the walls of common cysts; *i. e.* of cysts which did not originate in cancer-structures. Thus medullary cancers may grow, especially in the villous form, from the walls of ovarian cysts, which have themselves no cancerous appearance.*

There may be other methods in which, as by a sort of accident, cysts and cancers may thus become connected; but these are the chief examples. In the second class, including those in which the cysts appear to be derived from cancer-structures, we find numerous varieties, which may be studied as a series parallel with those of the simple and the proliferous cyst-formations in the natural structures, or in innocent tumours. (Compare Lectures II. III. and page 81.)

(*a*) Cysts filled with fluid, like serum variously tinted, and in their general aspect resembling the common serous cysts (page 35), are often connected with cancers, especially with those of the medullary form that grow quickly or to a great size. There may be one or many of such cysts,

* Museum of St. Bartholomew's, xxxi. 20.

lying at the surface, or imbedded in the substance, of the cancer. Sometimes, a single cyst of the kind enlarges so as to surpass the bulk of the cancer, exceedingly confusing the diagnosis.* In other cases so many cysts are formed, that the tumour appears almost wholly composed of them, the cancerous structure only filling the interstices between their close-packed walls.† Such cases might justly be grouped as a "cystic variety" of medullary cancer.

(*b*) Sanguineous cysts are found, as often as the serous, in connection with the medullary and other cancers; and the changes which the blood undergoes in them add not a little to the multiformity of appearances that the cancerous masses may present.

(*c*) The colloid cysts here find their type (page 51); not only as constructing the peculiar variety of cancer just described, but as being mingled with ordinary cancerous growths; for it is common to find, with such growths, especially in the abdomen and pelvis, cysts filled with thickly viscid material, like mucus, or half-liquid jelly, in all the varieties of tint that we see in the cystic disease of the kidney or of the thyroid gland.

(*d*) While thus the principal varieties of simple or barren cysts are found in cancerous growths, as in the original tissues or in simple tumours, so may we also trace in them the production of proliferous cysts; *i. e.* of cysts from whose inner surfaces cancerous growths arise, corresponding with the glandular growths that may fill the cysts in the mammary or thyroid gland (page 65). I have already often referred to this (pp. 81, 358, 451, &c.); and, now, need only add that such endogenous growths are often to be found in the

* Bruch (Die Diagnose der bösartigen Geschwülste, p. 1); Mus. Coll. Surg., 281.

† Mus. Coll. Surg., 277, 279, 280, &c.; Mus. St. Bartholomew's, xxxv. 14, and others.

alveoli of the colloid cancer. Clusters of clavate, or flask-shaped, villous processes, like those formed in the early stages of the dendritic vegetation of villous cancer (page 511), spring from the wall of the alveolus. With laminated walls, and cancer-structures, or new cysts in their cavities, such villous growths crowded together probably constitute the structures which I have described after Lebert (page 521, fig. 70, c).* To less perfect endogenous growth we must, I suppose, ascribe the cancer-structures which are found disorderly mingled with the colloid contents of the alveoli.

Thus is the general anatomy of the autogenous cysts, which I described in the second and third Lectures, paralleled in the cysts connected with cancers. It may suffice to add that Rokitansky has traced a similar correspondence in their origin and modes of development. The account of the formation of cysts (page 30—34) might therefore be again read here; with the understanding that the nucleus, or smaller corpuscle, by whose enormous growth a cyst is formed, is here a cancerous element, while, in the cases there cited, it was supposed to be an element of some natural tissue. A part of the process is, moreover, already exemplified in the instance of epithelial cancers (page 441, fig. 61-2); but in these, the cysts, produced in the shape of laminated capsules, are very rarely barren, or filled with colloid substance.

Respecting the history of colloid cancer, the number of well-recorded cases, especially of those in which external parts were its primary seat, is too small to authorize many general statements.

* Compare Lebert's figures with those of Rokitansky (Ueber die Cyste, pl. iv. fig. xvi.)

Lebert has shown, by his collection of cases, that it generally corresponds with the history of scirrhous and medullary cancers; that the cases are about equal in the two sexes; that the greatest absolute frequency is at the middle period of life; that the disease is very rare in childhood;* that it is probably of somewhat slower average progress than the medullary cancers; that it more slowly affects the lymphatics and the organs distant from its primary seat; that, in general, its symptoms in each part correspond with those of other cancers affecting the same part: and this summary, I believe, includes all that can be prudently said upon the matter.

* He adduces two cases of children, in which one was two, the other one and a half years old. Mr. Edward Bickersteth has observed two cases of colloid cancer of the kidney in children, one of whom was 3½, the other 11, years old.

LECTURE XIV.

GENERAL PATHOLOGY OF CANCER.

PART I.

CONDITIONS PRECEDING THE CANCEROUS GROWTH.

I PROPOSE, in this and the next Lecture, to consider the general pathology of all the forms of cancer which have now been particularly described; to gather a general history of them from the statements made concerning each; and to trace how the laws observed by them correspond with the more comprehensive laws of all specific diseases.

In the first Lecture (page 18) I stated the hypothesis which I think we must hold concerning cancers: namely, that they are local manifestations of certain specific morbid states of the blood; and that in them are incorporated peculiar morbid materials which accumulate in the blood, and which their growth may tend to increase.

In the terms which are more usual in discussions respecting the nature of cancers, I would say that a cancer is, from the first, both a constitutional and a specific disease. I believe it to be constitutional, in the sense of having its origin and chief support in the blood, by which the constitution of the whole body is maintained; and I believe it to be specific, 1st, in the sense of its being dependent on some specific material, which is different from all the natural constituents of the body, and different from all the materials formed in other processes of disease; and 2ndly, in the sense of its presenting, in the large majority of cases, structures which are specific or peculiar both in their form and in their mode of life.

The evidences for this hypothesis appear in the conformity of cancer to the other specific diseases, for which a similar hypothesis is nearly proved (Vol. I. Lect. XX.), and in the fitness of the terms which it supplies for the general pathology of cancer.

I will speak in this lecture of the conditions that precede the formation of a cancerous growth, and in the next of the growth itself.

The general history of cancers, and their analogy with other diseases that are, in the same senses, specific and constitutional, imply that, before the formation of a cancerous growth, two things at least must co-exist: namely, a certain morbid material in the blood, and some part appropriate to be the seat of a growth incorporating that material, some place in which the morbid material may assume, or enter into, organic structure.

The existence of the morbid material in the blood, whether in the rudimental or in the effective state, constitutes the general predisposition to cancer; it is that which is, by some, called the predisposing cause of cancer. The morbid material is the essential constituent of the "cancerous diathesis, or constitution:" and when its existence produces some manifest impairment of the general health, independently of the cancerous growth, it makes the "primary cancerous cachexia" (see page 341).

That which evidently makes some part of the body appropriate for the growth of a cancerous tumour is a so-called exciting cause of cancer; but it is a cause of cancer only in so far as it fits some part for the local manifestation of a disease which already, in its essential material, exists i the blood.

It seems very important to keep constantly in view th these two conditions must coincide before the appearanc of a cancerous growth; important not only to recognize thei existence, but, if we can, to measure the several degree in which, in each case, they are present; because, upon ou recognition of the shares in which they respectively con tribute to the production of the cancerous tumour, mus depend the chief principles of practice in relation to th removal of such tumours. The larger the share taken b the constitutional element of the disease,—that is, by th cancerous condition of the blood,—in the production of cancerous growth, the less is the probability of advantag to be derived from the removal of that growth; while, o the other hand, the more largely the local state enters int the conditions upon which the cancerous growth is founded the more benefit may we anticipate from the removal o the cancer and of the locality with it.

So, too, in our considerations of the mere pathology o cancerous diseases, it seems essential to have a just regard o both these previous conditions. If we look at only a certai class of cases, we may easily find enough to persuade ourselve that cancers are, from the first, and throughout their course wholly constitutional diseases; or, if we look exclusively a another class, which are as truly cancerous as the first (ac cording to any natural definition of the term), we may find equal evidence for believing that they are, at least in th first instance, entirely local diseases, and that the constitu tional affection which may attend them is only somethin consequent upon their growth.

When, for example, we see that certain organs are muc more liable than others to the growth of cancer, and that in those organs, the growth sometimes follows the infliction of a local injury, or some previous disease; and much more when we see, as in the case of the scrotal epithelial cancers, that the repeated application of a stimulus, such as soot, to a part of the body, will lead to the formation of cancer in even a large number of persons, we might assume that the growth has its origin wholly in the local state, and that whatever may follow of disease in other parts is only the consequence of the growth. On the other hand, when we consider the numerous analogies between cancers and the admitted specific blood-diseases; when we see the rapidity of outbreak with which cancerous disease sometimes manifests itself in multiple growths, apparently irrespective of the locality in which they are produced, and how, sometimes, a distinct affection of the general health, intense and destructive, exists even while the cancerous structure is yet trivial or unobserved; and when we see the insufficiency of all local causes to excite the growth of cancer in some persons, we might suppose that the cancerous disease is one wholly constitutional, wholly dependent on some morbid condition of the blood, and that the formation of the tumour is but as an accident of the disease, and is independent of the state of the part in which it occurs.

It is in correspondence with these classes of cases, too partially examined, that two distinct opinions are commonly entertained respecting the nature of cancer: some holding that it is from the beginning, and throughout, a constitutional disease; and others, that it is, in the first instance, if not through its whole course, a local one. The reconciliation, not only of the two conflicting opinions, but of the seemingly conflicting facts upon which they chiefly rest, is to be found in this,—that the complete manifestation of cancer—the formation of a cancerous growth—is suspended till such a time as finds both the constitutional and the local conditions co-existent,—till the blood and the part are at once appropriate.

I might show how consistent the belief of the necessity of this coincidence is with what is known of other specific diseases (as illustrated in the first volume). But let me illustrate it by two cases, such as may frequently be met with. Bruch* records the following:—A woman had a child at eighteen years of age. The child died when it was a month old, and her breasts were left to the disturbance which usually ensues in prematurely arrested lactation. At the age of thirty-four she received a blow on the right breast. This was followed by no manifest change of structure, but, for some days, by severe pains, and then, for a much longer time, by feelings of swelling and tension at the menstrual periods. At thirty-nine she received another blow upon the same breast, which was followed by an increase of pain. Soon afterwards she was exposed to cold, and then there ensued erysipelatous inflammation of the breast, followed by induration of a part of the mammary gland. This, however, continued without change for four years; but then, after menorrhagia, a tumour appeared in the breast. When this was removed, or partially removed, it was found to be not a cancerous, but a cystic tumour, with growths from the interior surfaces of the cysts. She remained well after this, the wound having perfectly healed, for twelve years more, and in this interval she ceased to menstruate; but now, when she was fifty-five years old, after having a whitlow and inflamed lymphatics of the right arm, another tumour formed in the breast, which had every appearance of being cancerous. It was removed; but it recurred, and ended fatally.

Now, surely, in such a case as this, we may say that all

* Die Diagnose der bösartigen Geschwülste, p. 94.

the local conditions necessary for the production of a cancer of the breast had been amply provided. They had existed, or had been reproduced from time to time, for a period of upwards of twenty years; yet, being alone, they had been insufficient; and no cancer appeared till the time when, at a more favourable condition of age, the cancerous condition of the blood was manifested, and filled-up the measure of the necessary precedents of the disease.

Contrast with the cases of this kind those to which I had occasion to refer in a former Lecture (page 392), and of which I may here repeat one. A boy received a cut in his eye, which had been previously sound. Within three weeks of the injury a fungus protruded from the eye. It was removed with the whole eyeball and the contents of the orbit. The wound had scarcely healed before a fresh growth appeared; and shortly afterwards the boy died with medullary disease extending from the orbit to the brain. We can scarcely express such cases as this in any other terms than that the cancerous condition of the blood existed at the time of the injury, but was insufficient for the production of a cancerous growth, and remained latent, for want of an appropriate locality for the growth, till the injury, disturbing or causing the suspension of the natural course of nutrition in the part, supplied the appropriate local condition. As one might say, the seed had been long present in the blood, but the soil was wanting, and the injury, hindering or diverting the eye from its ordinary nutrition, supplied the want, and prepared the soil for the growth of the cancer.

These cases, I repeat, are but examples of classes. In the one class, we seem to meet with all the constitutional or blood-conditions of cancerous disease complete, waiting only for the existence of some part in which the cancerous growth may be manifested; in the other class, the local conditions are abundantly present, but the disease does not appear till the cancerous condition of the blood is complete (compare Vol. I. p. 491).

It may, further, be deduced from these cases, in which the extremes illustrate the ordinary mean, that if either of the two conditions be present in an extreme degree, its intensity may compensate for a comparative defect of the other. Among the cases to which I have been referring, we find certain in which the cancerous disease makes its appearance in such a multiplicity of growths and of parts, that it seems indifferent to local conditions; and these are the very cases in which all the other constitutional characters of cancer are most strongly marked; in which cachexia often precedes the growth, and in which the removal of the cancer interferes in no way with the progress of the constitutional disease, unless it be to accelerate it. On the other side, we meet with cases in which the long-continued irritations, or frequent injuries of certain parts of the body, seem almost sure to be followed by cancer; and these are the cases in which the constitutional characteristics of the disease are least marked, and in which, as in epithelial cancer of the scrotum and of scars, we may hope that the recurrence of the disease may be long deferred, if that which has first appeared be removed with its seat. In this class of cases, it may be said, the cancerous blood-condition is so lowly developed, that the cancerous growth can ensue in none but a peculiarly appropriated part, which part being removed, the growth is for a time, or for life, impossible; while, in the former class, the blood-condition is so highly developed, or so intense, that almost any part suffices for the seat of growth.

Let me now proceed to consider what each of these conditions, necessary as precedents of the growth of a cancer, consists in. What is the cancerous condition of the blood?

and what is the state of a locality apt for the formation of a cancerous growth?

I. Concerning the state of the blood, our positive knowledge is very trivial and obscure; perhaps it would be safest to say that we have at present none. We may be sure, on grounds to which I have already referred, that there is a peculiar material in the blood which is separated from it, and constantly renewed, in the formation of a cancer; but we can say what this material is not, rather than what it is.

We may reasonably hold that, in cancerous persons, the whole constitution of the blood is not perverted; for we see that all the tissues may for a long time be perfectly nourished, even while the cancer is making progress; that injuries may be repaired with the ordinary quickness and perfection; that the products of inflammation may be like those in non-cancerous persons, and may pass through their ordinary developments; and that some other specific diseases may have their usual course. It would therefore be unreasonable to regard the whole of the blood of a cancerous person as perverted from its normal condition. The cancerous state is not a total change of the blood, but depends, probably, on some definite material mingled with the natural constituents: and this material, we may believe, is derived from a morbid transformation of one or more of the natural constituents of the blood, and is maintained, as morbid structures are, by the persistence of the same method of transformation, or by its own assimilative force.

But now, as to what this material is; or, again, is not. I believe it is not anything visible to the sight. There is not, so far as I know, anything in the blood of a cancerous person which we can recognise as a cancer-structure. There are no cancer-cells, nor, in any form, visible germs of cancer, existing in the blood, and only needing to be separated from

it to make-up or grow into the cancerous structure. In ad
vanced cases of cancer, and especially in those in which th
cancerous substance is very softened and broken, we ma
meet with portions of it in the blood, which appear as i
they had been detached or absorbed from some growth, an
carried-on with the stream. In similar cases we may fin
cancerous formations in the blood itself. Such seem to b
some of the cancerous growths in the veins and the righ
side of the heart. For, although, among the former, ther
are many in which the growth has only extended into th
veins, through their walls involved in cancerous tumours
yet there are others in which, as in the endocardial cancers
the internal growth takes place far from any other tumour
In these we may believe that cancerous structures have bee
conveyed in the blood to the part of the vein, or of the righ
side of the heart, at which they have been arrested, and t
which adhering (either alone or with blood-clot), they hav
subsisted and grown on materials derived from the passin
blood. But none of these cases afford any support to
belief that, previous to the existence of a cancerous tumour
any visible germs of cancer exist in the blood.

Other means for investigating the very nature of the can
cerous material in the blood seem as impotent as the sight
Minute chemistry has, up to this time, done nothing; neithe
can we yet accept, I think, that which is in part a chemica
theory, and has been especially held by the pathologists o
the Vienna school,—namely, that particular diatheses o
dyscrases of the blood, appropriate to such diseases as cance
and tubercle, may be recognised by a superabundance o
albumen or of fibrin. The facts adduced as bearing directl
on these doctrines are, at present, few and incomplete; an
although the course of investigation, in which they have bee
observed, is the most hopeful yet entered upon, I think
they are not sufficient either to establish the theories base

on them, or to outweigh the general improbability, that diseases so complex as cancer and tubercle should depend, chiefly, on quantitative variations in any of the larger constituents of the blood. Neither can it, I think, in the present state of organic chemistry, and with so few analyses as we yet possess of the blood of cancerous and other diseased persons, be more than a guess, that either cancer or any other such specific disease, depends, in any sense, on qualitative modifications of the albumen, or the fibrine, or any other single constituent of the blood.

At present, I believe, the best part of the facts established, or made probable, by these investigations, relate to the antagonism or incompatibility of cancer and certain other specific diseases. I think we cannot doubt that, as a general rule, cancerous and tuberculous diseases do not make active progress at the same time; and that, in this sense, they exclude one another, and are incompatible. I mentioned in a former Lecture (p. 337), a striking case bearing on this point, in which, as it seemed, the rare event of arrest and almost complete recovery from scirrhous cancer was connected with the evolution of tuberculous disease. I believe, also, that I have seen at least one instance in which active tuberculous disease of the lungs was arrested immediately before the appearance of a scirrhous cancer in the breast; and we find, in so many of those who die with cancer, the remnants of tuberculous disease from which they have suffered in earlier life, that we may believe that the recovery from the one has been in some manner connected with the supervention of the other. So, on the other side, the rarity of progressive tuberculous disease in those that are cancerous may be because, except in such extremely rare cases as that to which I have referred, the cancerous diathesis excludes that condition of the blood in which the tuberculous disease has its rise.

To the same class of facts, as illustrating the exclusion of one morbid condition of the blood (or, as Hunter would have said, of one morbid action,) by another, we may perhaps refer the occasional withering of a cancer under the influence of some fever, and the more rarely occurring complete death of one, so that during an attack of acute fever the whole mass may slough off; and this whether the feverish condition of the blood be produced by some miasma, or by medicinal means. Such, I fear, is all that can be, at present, safely regarded as matter of fact in relation to the nature of the peculiarity of cancerous blood; and it must be admitted that these facts are scarcely more than indications of the direction in which inquiry should be made. Let us next see if we can, in any measure, trace the method of its production;—whence the specific material is derived from without, and the conditions most favourable to its generation within, the body.

First, it is evident that a disposition to cancer may be derived by inheritance; that something may be transmitted from the parent to the offspring, which shall ultimately produce both the cancerous condition of the blood and the locality apt for the cancerous growth.

The proportion of cases in which this hereditary transmission is manifested, is, it is true, but small. In 160 cancerous patients, there were 26, or very nearly one-sixth, who were aware of cancer in other members of their families (see pages 328, 391). The proportion may seem too trivial to reason upon, yet it is larger than could be due to chance (page 461); and its import is corroborated by the fact of so many members of the same family being in some instances affected.

That which is transmitted from parent to offspring is not, strictly speaking, cancer or cancerous material, but a tendency to the production of those conditions which will, finally, manifest themselves in a cancerous growth. There are here some facts worth dwelling upon, both for their own sake, and because they are clear instances of the manner in which the hereditary transmission of the properties of the parent-body takes place.

I repeat, that which is transmitted from parent to offspring is not cancer itself, but a tendency to the production of cancer at some time far future from the birth. We have no reason to believe that a cancerous material passes with the germ. To suppose such a thing, where the cancerous parent is the male, would be almost absurd. Moreover, no reason to believe that cancerous material passes from either parent is furnished by any frequency of congenital cancer, or (so far as I know) by cancer being earlier developed in the offspring of cancerous parents than in other persons.

But while, on the one hand, we cannot assume that a cancerous material passes with the germ or impregnating fluid; on the other, we cannot understand the transmission of a tendency or disposition to any event, independently of all material conditions. The germ from the cancerous parent must be already, in some condition, different from one from a parent who is not cancerous, if, in the course of any number of years, cancers are to be formed out of the substance which the germ, in its development, or subsequent changes, will appropriate. Our expression, then, may be, that in the impregnated germ from a cancerous parent, one or more of the materials, normal as they may seem, are already so far from the perfectly normal state, that after the lapse of years, by their development or degeneration, they will engender or constitute the cancerous material in the blood, and, it may be, the locality apt for a cancerous growth.

But now, let it be observed, this tendency to cancerous disease is most commonly derived from a parent who is not yet manifestly cancerous; for, most commonly, the children are born before cancer is evident in the parent; so that we may say, that which is still future to the parent is tr mitted potentially to the offspring. Nay, more: the dency which exists in the parent may never become in or her effective, although it may become effective in the spring: for there are cases in which a grandparent has b cancerous, and although his or her children have not b so, the grandchildren have been. How admirable a discov it would be if we could find the means by which the t dency, conveyed from the grandparent to the child, was diverted from its course, even after it had been transmit to the germ of the grandchild!

Let me repeat, the cases of hereditary cancer only ill trate the common rule of the transmission of heredit properties, whether natural or morbid. Just as the parent the perfection of maturity, transmits to the offspring th conditions, in germ and rudimental substance, which sh be changed into the exact imitation of the parent's self, only in the fulness of health, but in all the infirmities of future age; so, also, even in seeming health, the same par may communicate to the materials of the offspring the ru ments of yet future diseases; and these rudiments must, the case before us, be such modifications of natural co positions as, in the course of many years, shall be develop or degenerate into materials that will manifest themsel in the production of cancer.

There is, surely, in all science, no fact so strange as th and it need not be a barren fact, fit merely for wonder a vain speculation; for we may deduce from it that the canc substance in the blood, whatever it may be, and whencesoe derived, is a result of long-continued elaboration; needi as the normal materials of the body do, to pass throug life of continual change before it attains its complete e ciency. The period required for this completion of t cancer-material, is the time, often of long delay, during which the disease, according to various expressions, is "latent," or only "in predisposition." But such expressions are deceptive. As with other specific blood-diseases, so with cancer, the predisposition to it is a substantial thing; and we should hold that, in all the time of latency, there is that thing in the blood, which will become, or generate by combination, the effective cancer-material, unless (as in the healthy generation between the cancerous grandparent and the cancerous grandchild) it be destroyed or retained in the course of natural nutrition.

In hereditary transmission, the cancer-material may be modified, so that the form of the disease in the offspring may be different from that in the parent. The change from scirrhous to medullary cancer, and *vice versâ*, is, I believe, not rare. I have mentioned cases of alternation between these and the epithelial cancers (page 460); and a case of melanoid cancer in a patient descended from one with a scirrhous breast (page 487). Mr. Simon has told me that he removed a colloid cancer from the cheek of a woman whose child, seven years old, was dying with medullary cancer of the eye; and M. Lebert, with two cases like these, relates that the celebrated Broussais died with medullary cancer of the rectum, and his son, Casimir, with colloid cancer of the same part. With so many cases supporting it, this kind of transmutation during transmission of cancer can hardly be doubted. But, I believe, we may trace further changes in the transmission; and that the material may be so altered that, as we may say, the cancerous disposition may gradually cease, or fade-out in the production of tumours, whose characters are intermediate or transitional between cancers and simple growths. I have referred (page 187, 260) to cases illustrating this opinion; and I feel sure that many more will be found; for we may observe corresponding changes, in both form and degree, in the hereditary transmission of many other diseases. Thus the syphilis of the infant is seldom exactly like that of the mother; the same family may include cases of insanity, epilepsy, palsy, chorea, stammering, and other diseases allied to these in that all are affections of the nervous centres, but differing from them in form and degree.*

The rule of hereditary transmission (a rule which, like many in pathology, has more seeming exceptions than examples†) holds for only a sixth of the cases of cancer. Can we, for the remaining five-sixths, trace any external source of the morbid condition of the blood? Inoculation and contagion are the only probable sources of the kind; but concerning these the presumed facts are, at present, very few and uncertain. There are cases in which, by the inoculation of cancerous material into the bodies, or by the injection of such material into the blood, of dogs, cancer has seemed to be produced. I think that, in a large number of experiments, that result has been three times obtained; but it is quite possible that the dogs used for these three experiments were cancerous before the human cancerous matter was injected into them; for cancer is indeed a frequent disease among dogs. The instances are certainly too few for proof of inoculation.

There are, also, certain cases in which it seems possible that cancer may have been transmitted from the wife to the husband during the act of copulation. Such cases are re-

* Hereditary malformations display similar mutations *in transitu*; as in instances in the Museum of St. Bartholomew's, Casts A 21 to 27. The whole of this subject of the change of diathesis on hereditary transmission will repay, I believe, the deepest study.

† Vol. I. p. 481.

corded by Dr. Watson and Dr. Copland:* wives having cancer of the uterus had husbands with cancer of the penis. Of course, it must be questionable whether there were in these cases more than the accidental coincidence of persons having married, in both of whom an ordinary and independent generation of cancer ensued; and we cannot conclude that inoculation of cancer may thus occur, unless it should appear that persons thus related become cancerous in larger proportions than they do who, being otherwise in similar conditions, are not thus exposed to the possibility of inoculation.

Again, I have heard that cancerous matter having been inoculated under the skin of frogs, cancerous growths have been produced in them. I have repeated this experiment, but without effect; for all the frogs in whom I inserted the cancerous matter died soon after. But the facts, so far as I have yet heard them, have not much meaning in relation to the general pathology of cancer; for I believe it is not yet proved that the local growths of cancer, which are the consequence of the inoculation, are followed by general cancerous disease, or by the production of cancer in distant parts, as well as in that in which the matter was deposited. Unless this occurs, the experiments only prove the fact (and a very strange one it is) that materials of disease from human bodies, being inserted in the bodies of cold-blooded animals, will live and grow, even upon the materials of the cold-blooded creature. In like manner, if any one could establish the supposed cases of husbands inoculated by their wives, he might only prove that cancerous elements may subsist and increase upon other materials than those of the body in which themselves were generated. Unless the cancers thus generated, in the first instance locally, are found

* Dict. of Pract. Med.; Art. Scirrhous and other Tumours.

to multiply themselves in distant organs, these cases of in culation will prove no more than that cancer, like a parasit growth, may be transplanted, and grow on common or i different nutritive material; they will have no bearing the questions concerning the nature and origin of cancero blood.

At the most, then, we may assume that a transference cancer by inoculation is possible. But such an assumpti will not materially diminish the number of cases in whi we look in vain for any external source for the disease, a in which all that we can study are the conditions mo favourable for its production within the body. Of the conditions I have already spoken, in relation to each of t principal forms of cancer. I need, therefore, do little mo than sum-up the general conclusions concerning them.

First, respecting the influence of sexual peculiaritie Women are, on the whole, more liable to cancer than m are; but in what proportion they are so cannot be exact stated: Lebert assigns about 37 per cent. as the proporti of cancers in males: Dr. Walshe finds it scarcely more th 26 per cent. This is just one of the points on which t truth will not be known till statistics are collected by pra titioners under whose charge the two sexes, and all t organs of each, fall in just proportions, and by whom t existence of internal cancers is as constantly ascertained autopsy as that of external cancers. The frequency cancer of the breast and uterus gives an apparently lar preponderance of cases in women; but, on the other sid the cancers of the skin, bones, and digestive organs, grea predominate in men. The liability of the breast mak scirrhous cancer by far most frequent in women: but th in a general estimate, may be nearly balanced by the p ponderance of epithelial, osteoid, and villous cancers in men.*

The influence of age may be more definitely stated. Dr. Walshe has clearly shown that "the mortality from cancer" [*i. e.* the number of deaths in proportion to the number of persons living] "goes on steadily increasing with each succeeding decade until the eightieth year." His result is obtained from records of deaths; but it is almost exactly confirmed by the tables I have collected, showing the ages at which the cancers were first observed by the patients, or ascertained by their attendants. In 772 cases, including cancers of all kinds, the ages at which they appeared were as follows:—

Under	10	years	27
Between	10 and 20	,,	30
,,	20 and 30	,,	78
,,	30 and 40	,,	130
,,	40 and 50	,,	200
,,	50 and 60	,,	152
,,	60 and 70	,,	98
,,	70 and 80	,,	57

The proportions between these numbers and the numbers of persons living at the corresponding ages (calculated in the same manner as in the previous Lectures, pp. 326, 390, 459), will show the proportionate frequency of cancer at each period of life, and may be represented by the following numbers:—

* The particular influences of sexual difference may be collected from pp. 324, 388, 457, 487, 503. On all the questions capable of being solved by statistics, the largest information is collected by Dr. Walshe.

Under 10 years - - - -	5
Between 10 and 20 years - -	6·9
„ 20 „ 30 „ - -	21
„ 30 „ 40 „ - -	48·5
„ 40 „ 50 „ - -	100
„ 50 „ 60 „ - -	113
„ 60 „ 70 „ - -	107
„ 70 „ 80 „ - -	126

Thus, the liability to cancer seems always increasi from childhood to eighty years of age. A single exce tion to the rule (between 60 and 70) appears to exist; b this would very probably not appear in estimates from larger number of cases. The general fact, and that of t immense increase of cancer after 40 years of age, are exceeding value in proving that it is a disease of d generacy.

Within this larger rule, others may be collected from t foregoing Lectures. Of the three chief forms of cancer, t medullary alone exemplifies the rule of frequency constan increasing from earliest to latest life; but the rate of i crease is, of course, different from that shown in the gene table (p. 390-1). The epithelial cancers exemplify the ru after the age of 20; before that age they are scarcely fou (p. 459). The scirrhous have their maximum proportion frequency between 40 and 50* (p. 326). The melano cancers are nearly conformed to the rule of the medulla The osteoid and colloid probably have rules of frequen

* It is probably due to this great frequency of scirrhous cancer the female breast, that (as Dr. Walshe found) the increase of m tality from cancer between 40 to 50 is so much greater in wom than in men.

peculiar to themselves, and depending upon local conditions: but we need more cases to calculate them.

The increase in frequency of cancer with increasing years, its great prevalence after middle age, and the conformity to this rule shown by medullary cancers which are least of all dependent on locality for their development,—these facts may prove, as a rule, that cancer is a disease of general or constitutional degeneracy. But, as in every other part of the pathology of cancer, so, in estimating the influence of age in its production, we must consider the effect of time in making certain parts apt to be the seat of cancer. Such an effect is shown in the different liabilities which each organ manifests at different periods of life. These cannot be exactly stated; but, beyond doubt, the eye and orbit are earliest apt to become cancerous; then the bones, testicles, and the cellular tissue of the limbs and trunk. These are its chief seats before 30 years of age; from 30 to 50 it predominates in the penis, uterus, external sexual organs, and the breasts; after 50, in the integuments and digestive organs.* I fear nothing can be said of the real nature of the changes ensuing in each organ, which thus make it, at different times of life, more or less appropriate for the seat of cancer. In some parts, as the testicles and limbs, the chief liability seems to coincide with the first attainment, or with the time of failing in the attainment or maintenance, of full functional power; in others, it falls-in with the beginning of the loss of power, as in the uterus and breast.

Two other conditions seem to have influence in producing or promoting the cancerous constitution: namely, climate,

* More rules of this kind may perhaps be gathered from the statistics of Walshe and Lebert; but with caution, for want of such records as I have said are necessary to estimate the liabilities of the sexes.

and mental distress. Dr. Walshe has collected evidence that "the maximum amount of cancerous disease occurs in Europe," and that it is very rare among the patients of the Hospitals at Hobart Town and Calcutta, and among the natives of Egypt, Algiers, Senegal, Arabia, and the tropical parts of America. We cannot, indeed, be sure that this difference depends on climate; it may be due to the national differences in habits of life; possibly, as Dr. Walshe suggests (p. 161), the greater prevalence of cancer may be due to the more wasting influence of the higher state of civilization. More records are necessary to decide such questions; and it may be well if they include accounts of the apparent variations of cancer among nations whose climate and habits of life are not materially different. (See pp. 380, 470.)

It is only on a general impression, not by counted facts, that we can reckon deep mental distress among the conditions favourable to the production of cancer. I do not at all suppose that it could of itself generate a cancerous condition of the blood; or that a joyous temper and prosperity are a safeguard against cancer; but the cases are so frequent in which deep anxiety, deferred hope, and disappointment, are quickly followed by the growth or increase of cancer, that we can hardly doubt that mental depression is a weighty addition to the other influences that favour the development of the cancerous constitution. Nor is it strange that it should be so; it is consistent with the many other facts showing the affinity between cancer and depressed nutrition.

But, after all, when we have assigned to these conditions their full weight in producing the cancerous constitution or state of the blood, that which may strike us most of all is the comparatively small influence which any known internal or external conditions possess. We are, as yet, wholly unaware of any great difference, in the frequency of cancer, among those of our own nation who are most widely apart from each other in all the ordinary conditions of life. The richest and the poorest alike seem to be subject to it; so do the worst- and the best-fed; those that are living in the best conditions of atmosphere, and those that are immured in the worst; those that are cleanly, and those that are foul; those of all temperaments, and of all occupations (except such as have peculiar local influences); those that appear healthy, and those that are diseased, except those with some few specific diseases. We can hardly lay our hand upon any one of the various circumstances of life, in the various orders of society in this country, to which we can refer as rendering one more or less liable than another to the acquirement of the cancerous constitution. Dr. Walshe's evidence amply shows the want of foundation of all the general impressions opposed to this conclusion.

From this confession of ignorance respecting the production of the cancerous constitution, or, as I would say, of the cancer-material in the blood, when it is generated within the body, I will proceed to speak of some of the changes which, being once generated, it may undergo.

In all ordinary events the normal course of cancerous disease is that of steady increase, steady progress towards death. The increase is indicated by two different, but usually commensurate, series of phenomena: those, namely, of increasing formation of cancer-structures, and of increasing cachexia.

We may commonly observe, that, from the beginning of a cancerous formation, there is a constant increase in its mass, and in the rate at which it is added to. Even the cancers that are, in part, ulcerating, are usually growing, at a greater rate, at the border or surface opposite to that in which ulceration is destroying them; or else, while ulceration is going on in one cancer, there is a greater rate of increase in others; or, the number of growing masses is constantly increasing. In one or more of these methods most cases exemplify the general rule, that the quantity of cancer which is formed, within any given length of time, regularly increases from the beginning to the end of the case.

In most cases the increasing formation of cancer is accompanied by manifest indications of increasing cachexia. But it is not always thus; and, on the other hand, we find cases in which the cachexia increases without proportionately increasing cancerous formations: cases in which we may say that the cancerous condition of the blood manifests itself less plainly in the production of growths, than in its interference with the ordinary phenomena of life. Such cases are not unfrequent among those of cancer of the rectum: we see the patient intensely ill, and dying with cachexia, to which the extent or rate of growth of the cancerous tumour bears no proportion. So, sometimes, with cancer of the liver; the cachexia is quite disproportionate to the amount of cancerous formation, and to the degree in which it interferes with the functions of the organ. In these cases, the cancerous disease exemplifies a frequent event in the history of specific diseases: namely, that when the morbid material is most intense and acute in its action, when it most manifestly affects the constitution, it may produce the least indications of local morbid influence.

In both these sets of cases, the increase of cancerous disease, and its accelerating rate, are illustrated as the rule of its career. The phenomena, in the first set of cases, may be explained by assuming that the quantity of cancer-material in the blood regularly increases; those in the second, that, with its increase, it undergoes some transformation, rendering it less appropriate for growths, but more injurious to the other offices of the blood.

(*b.*) The cancerous constitution may apparently cease; a growth already formed may maintain itself, subsisting, probably, on the normal constituents of the blood,* but its progressive increase may be, for a time, suspended. I have exemplified this by cases of medullary cancer (p. 394), of which the general history was, that, after a certain period of increase, the tumours ceased to enlarge, were for a time stationary (the general health also remaining the same), and then resumed the cancerous mode of progress.

(*c.*) The cancerous constitution may be in some measure changed or modified. It may manifest itself for a time in a certain form of cancer, and then in some other form. Thus scirrhous cancer may be succeeded, in secondary growths, by medullary cancer; osteoid by medullary, and vice versâ; and, I think, epithelial by medullary. We must, I believe, in these cases assume a transformation of the specific cancerous material in the blood—a change corresponding with that which may be more regularly traced in the materials of other specific diseases (*e. g.* of syphilis) in their successive stages or periods of life (Vol. I. pp. 483, 494).

Lastly, the cancerous diathesis, even after it has been manifested by growths, may be superseded. Thus we may express the cessation, or retrocession, of cancer, when tuberculous disease ensues in its course.

In the last three events the rule of progress in cancer is departed from. But if we could reckon all the cases in

* I shall revert to this point in the next Lecture. The maintenance, or even the increase, of a cancerous growth, does not necessarily imply that a cancerous condition of the blood is maintained: once formed, a cancer, like any other tumour, may live and grow by its assimilative power over cancerous materials.

which any of these events happen, they would make but a few exceptions to the general rule, that the cancerous constitution regularly increases at an accelerating rate, and with little change in its methods of manifesting itself.

I pass now to the consideration of the second necessary precedent of a cancerous growth, namely, the existence of some part fitted to be its seat—some apt locality. Such fitness may be natural or acquired; and in parts in which it is in some measure natural, it may be increased by accident or disease.

Certain parts of the body are evidently, and independently of external influences, far more liable than others are to become the seats of cancer. They are, thus, naturally apt localities; not equally so throughout life, but usually becoming so at certain periods.

We have no such full and impartial statistical evidence as might enable us to state clearly the proportions in which the several organs are primarily or secondarily affected with cancer. There are at present, I believe, no large statistics on which we can place reliance for accurately determining this point: bills of mortality, founded upon diagnoses not confirmed by autopsy, and the records of those whose practice is chiefly medical or chiefly surgical, supply only unsafe or partial evidence.

It cannot be doubted that the uterus, stomach, and female breast hold the first place in aptness for primary cancerous growths; and the lymphatics, lungs, and liver, for secondary growths; and that among the parts least liable to either affection are, the spinal cord, tendons, tonsils, pharynx, and prostate gland. But beyond these general statements none, I think, can be safely made. Neither does any explanation yet offered of the different liabilities of parts seem well-founded. As Dr. Walshe observes, all that has been said to explain the liability of the breast and uterus may be equally well said of the ovaries, which are comparatively rarely cancerous. So, too, what has been said about the brain and stomach, and testicle, is just as applicable to the spinal cord, the duodenum, and the epididymis; yet these parts of similar systems are, severally, in complete contrast in their aptness to be the seat of cancer.

It seems impossible, at present, to discover what it is that makes one part more than another naturally fit to be the seat of cancerous growth; or any part more fit at one time of life than at another. We are, of course, disposed to look for explanation to peculiarities of tissue, and to their changes with age; and we can hardly doubt that these are chiefly influential: and yet, as the medullary cancers of the eye-ball and orbit share (p. 380), we must ascribe something to locality as well as to tissue. The *allocation* of cancers is certainly not wholly determined by aptness of structures. An osteoid cancer, for example, affects at once cancellous and compact osseous tissue, medulla, periosteum, and surrounding muscles; a medullary cancer may occupy, from the first, many tissues both within and around the eye-ball: when a cancerous breast is cut away, the recurrent growths appear very commonly in the scar, *i. e.* in the same locality, though all the tissues affected by the primary growth are gone. Very numerous cases such as these might be cited; they cannot, I presume, be explained, but they suggest the need of considering always that morbid products may be determined to certain *places* as well as to certain *structures*. As each natural organ has its appropriate place as well as structure, so, but with almost infinitely less regularity, morbid growths may have laws of allocation.

A question of much interest is connected with the liability of other tumours to become cancerous; it is of interest not only as a subject of pathological enquiry, but in relation to an opinion which is often made a reason for operations: namely, that if a tumour of any kind is left to its own course, it is not unlikely to become cancerous. I have looked carefully into this question, and I believe there are no facts sufficient to justify the opinion that an innocent tumour is more likely to become the seat of cancer than many other parts of the body in which it is growing. The only case supporting such an opinion is that of cystic disease of the ovary. I think there is no doubt that it is not unfrequent for cysts of the ovary to exist, for a time, as an innocent disease, and then become the seat of cancerous growths. But, then, the case of cystic disease of the ovary is so peculiar in all respects, that we cannot deduce from it any rule to be applied to instances of other tumours.

With regard to the supposed transformation of any other tumours into cancers, the facts are very few.

M. Lebert states that he has twice met with tumours which were at first of an innocent kind, but afterwards became cancerous; but he does not state whether they were in persons who had cancer in some other part: *i. e.* whether the cancer in the tumour were secondary or primary.

Sir Benjamin Brodie mentions a case in which he removed a tumour, the general mass of which appeared to be fatty substance, somewhat more condensed than usual, but "here and there was another kind of morbid growth, apparently belonging to the class of medullary or fungoid disease."* A few other cases of the same kind are related; and some would assume that in all the cases of mixed cartilaginous and cancerous tumours (mentioned at p. 208) the cartilaginous growth was being transformed into, or superseded by, the cancerous one. I see no good evidence for such an assumption: the contrary might very well be maintained in

* Lectures on Pathology and Surgery, p. 282.

argument; or the two growths might be regarded as simultaneous in their origin.

It need not be denied that cancerous growths may occur in tumours that were previously of an innocent kind, but I feel quite sure that these may be regarded as events of the greatest rarity. My own experience has (perhaps by chance) been such as would indicate that innocent tumours are less liable to cancer than the structures they resemble; for, as I have elsewhere mentioned (p. 259), I have seen three cases in which cancer affected the natural structure of the mammary gland, while, close by, mammary glandular tumours remained unaffected.

It may be asked, whence is derived the impression that so commonly exists, that a tumour of an innocent kind is peculiarly apt to become cancerous? I believe it has arisen from several different kinds of deceptive cases.

First, there are the cases of what I have referred to as the suspension, for a time, of cancerous progress; in these the cancer seems for a time to be an innocent tumour; it is judged to be so because it remains so long quiet; and when it assumes the ordinary progress of cancer, it is said to be a tumour once innocent, but now become cancerous. This might have happened in the first and fourth of the cases mentioned at p. 395: yet, without doubt, in these cases, the tumours that made little or no progress had all along the cancerous structure.

Another class of deceptive cases have a history of this kind:—a tumour is removed which is apparently of an innocent sort; but, some time after, a cancer appears at the same part. The explanation of some of these cases is (as I suggested in p. 259), that a simple tumour has grown in a person having an hereditary or other constitutional tendency to cancer; and that, in the removal of this tumour, the surgeon has unwittingly supplied, by the local injury what was needed for the production of a cancerous growth he has made some locality apt for the manifestation of a constitutional disease already existing.

In a third class of cases, we may find in the same person a succession of tumours, of which the first may have few or no characters of cancer, and the last, as if by gradual change, may be evidently cancerous. I have referred to this in connection with the recurring fibroid tumours (p. 165); but the facts have little bearing on the question whether an innocent tumour can become cancerous: for here the transition is effected, not in one tumour, but in a succession of tumours.

By cases such as these we may, I believe, explain away the grounds for the assumption that simple or innocent tumours are parts peculiarly apt to become cancerous. Cancers may grow in such tumours, but the event is so rare, that it cannot, in any given case, be reasonably anticipated.

It remains to consider how parts may acquire an aptness for cancerous growth in them, or, in most instances, how that aptness which they naturally possess may be increased : for it is very observable that the "exciting causes" of cancer act with far greatest effect on the parts which are, without their help, most liable to it.

Three chief conditions may be here enumerated : namely, the results of certain diseases in intra-uterine life, indicated by congenital defect; the results of certain diseases after birth; the consequences of injury.

The aptness for cancer due to congenital defect is exemplified in the peculiar liability of moles or pigmentary nævi to become the primary seats of melanosis. I have already enlarged on this (p. 490), and have suggested that these defects, which we can easily see, may be only examples of a larger group which, though invisible, are not less efficient in rendering certain parts peculiarly liable to cancer.

The aptness due to diseases after birth may be illustrated by the liability of the incrusted warts and scars, and other morbidly changed parts, to become the primary seats of epithelial cancers. For other than epithelial cancers the effect of disease in disposing parts to cancer is slight. We find no remarkable liability in parts that have been changed by inflammation, whether of common or specific kind. Few theories, I think, have been less founded than those which have regarded scirrhous or medullary cancer as, in any sense, the result or sequence of inflammation. Parts that have been the seats of inflammation may become the seats of cancer; but I doubt whether the proportion in which they do so be much greater than that in which they become cancerous when apparently healthy.

The influence of injuries is more evident. About a fifth of those who have cancer ascribe it to injury; and although, doubtless, some of these are wrong in their belief, yet, among the rest, there are some in whom the consequence of injury is too evident to admit of doubt. But here a distinction must be made as to the manner in which injury promotes the production of cancers.

In certain cases, the cancerous growth appears immediately after the common effects of the injury. A person receives (suppose) a blow, and when its direct effects are passing away, a cancer appears in the injured part. I have cited cases of this kind in the history of medullary cancers (p. 392); among which, indeed, the event seems more frequent than among those of other forms.

In other and more usual cases, a much longer interval passes between the injury and the appearance of the cancer. The injured part seems to recover, without change of structure. In most cases, indeed, such as those of ordinary blows on the breast, the direct effects of the injury are not such as we might expect to be followed by structural change; yet, doubtless, the part remains different from what it was.

In a third class of cases, which are most frequently exemplified in the epithelial cancers, the injuries appear to be ineffective unless they are repeated time after time, so as to produce, we may suppose, a real change of structure in the part that at length becomes the seat of cancer (p. 462).

It is important to remember these different relations between injuries and the growth of cancers, not only for pathology's sake, but for practice.

It is often stated, as a rule, that those cancers are least likely to return (it should be said, to return quickly), after removal, which have followed the receipt of injury, or some previous disease in the part. Now, this is only partially true; it is, probably, often true of the epithelial cancers that have grown in the seats of repeated injury, of frequent ulceration, and the like; but I know no facts relating to scirrhous and medullary cancers that will support it; and I believe that the cases in which cancers follow quickly after accidental injury are just those in which a speedy return may be anticipated after operations. The growth of a cancer immediately after an injury implies the existence of an intense cancerous diathesis, which no removal of the cancer is likely to affect; but when a part has been repeatedly injured, and only at length becomes the seat of cancer, it implies such a low degree or stage of cancerous diathesis, as we may expect to remain long "latent," if the slowly-prepared locality, with all that has grown in it, be cleanly removed. Of the intermediate cases, in which some clear time intervenes between the injury and the growth of the cancer, we must hold, I think, that the abiding effects of the injury keep the part in a state peculiarly apt for the growth, till the constitutional condition is established. This being complete, the removal of the growth cannot change it; and the injury done by the operation would be enough to prepare a place, if none elsewhere were appropriate, for a recurrent cancer.

LECTURE XV.

GENERAL PATHOLOGY OF CANCER.

PART II.

STRUCTURE AND LIFE OF CANCEROUS GROWTHS.

I ENDEAVOURED to illustrate, in the last Lecture, tl two conditions which, judging from the general hist of cancers, and the analogy of other specific diseases, must assume as necessary precedents of a cancer growth: namely, the cancerous diathesis, constitution, morbid condition of the blood, and the condition of sc part appropriate for the growth. Now, according to same analogy, the assumed cancer-material in the blood, it cannot be removed by any natural excretory organ, determine the formation of some abnormal organism which itself may be incorporated; and this organism have a specific structure and mode of life significant of origin. It is of these—the general structure, compositi and life of cancerous growths—that I shall now speak.

It may be generally held that the characteristic structu of a cancer are altogether of new formation. But questi are often raised whether natural structures may not be tra formed into cancerous; or, whether cancerous materials m not be simply transferred from the blood into the natu textures; or, whether natural structures can assume cancerous properties. I believe such questions may be thus answered :—

(1.) It is not probable that any structure, once completely formed, can be transformed into any other. Structures may change by degeneration; but in this their changes are as limited and as normal as in development. The instances in which natural or other structures are supposed to become cancerous are, chiefly, those in which new-formed cancer-structures are inserted or infiltrated among, or, sometimes, within, those of the affected part. Of such cases we may say that the part becomes the seat of cancer; not that it becomes cancerous.

(2.) It is possible that, in the mutation of structures effected in the nutrition of certain parts, the elemental structures successively formed may gradually assume the appearance and properties of those of cancer. It has often been observed, in cases of cancer of the liver, that every gradation of structure appears, from the natural to the cancerous; and that, among the microscopic structures, are many of which it is hard to say whether they be hepatic cells or cancer-cells. It may be that this only exemplifies the tendency of cancer-structures to be conformed, in some measure, to those of the adjacent natural parts; but it may also be, that both the fact and this well-known tendency are evidences that cancerous properties may be gradually imparted to the undeveloped blastema in a part, so that the elementary structures successively formed from it may gradually assume more of the characters of cancer. In other words, as in inflammations we observe the wider deviations from the normal methods of nutrition or secretion, the larger the proportions are in which the inflammatory exudation is mingled with the normal products of the part (Vol. I. 343); so, it may be, increasing quantities of

cancerous material, added to natural blastema, may
represented by successive gradations of structure. I cann
doubt that transformation into cancer is, in this sens
possible; but its occurrence is not to be assumed as fr
quent, and is, probably, limited to such organs as the live
whose elementary structures are of the same general ty
as those of cancer, and are, in the ordinary process of secr
tion or nutrition, quickly changed.

(3.) It is possible that undeveloped cancer-material m
be separated from the blood, with the materials of natur
excretory organs, and may be for a time incorporated wi
the transient structures of such organs. We may assum
this from the analogy of the cases in which we believe th
other specific morbid materials are thus eliminated fro
the blood, as well as of the cases in which certain material
which should be separated from the blood by appropriat
organs, are, when the office of those organs is hindere
vicariously eliminated by others. In both these cases w
believe that alien materials are, for a time, incorporated i
the structures of the eliminating glands, and then discharged
and it is, in like manner, possible that cancer-materials
though their ordinary tendency is to determine the forma
tion of peculiar structures for their incorporation, may b
incorporated in those of natural glands.

So far, then, as the gradual change accomplished in a
succession of structures, or the introduction of cancer
materials into the elemental structures of excretory organs
can be called a transformation, the term is not chargeabl
with the absurdity which some impute to it. And the belie
of the possible transference of cancer-material into some
gland-structure is worth holding, for it encourages one o
the few hopes of curing cancer that at present seem
reasonable—the hope, namely, that means may be found by
which the morbid substance, transformed or combined, may

be constantly eliminated from the blood through the transient structures of some gland.

But these things are only possible: the unhappy rule is, that the natural consequence of the cancerous condition of the blood is, sooner or later, the formation of a cancer with specific structures and mode of life. Concerning these, it may suffice if I collect and comment upon the principal facts detailed in the foregoing Lectures.

In general construction, cancers may be either infiltrations or separate masses: *i. e.* their elementary structures may be either commingled, and form one mass, with those of a certain portion of a natural part, or they may be collected unmixed in a mass round which the natural tissues are extended. In any case, the mass they form is a growing part; and herein is the ground for classing them with tumours, and for separating them from those results of disease, such as inflammatory products and tubercle, which may be increased, but probably not by their own power of growth. (See p. 3, &c.)

In both their likeness and their unlikeness to other tumours, cancers exemplify what is common among specific diseases, namely, that they take certain general characters of common diseases, and, as it were, stamp them with some specific mark. Syphilitic eruptions are known by some specific character, added to those which are common to other eruptions of the same group: each specific form of ulcer has its own, together with common, characters; so, cancers have many characters in common with other tumours, but specific characters are superadded. (See Vol. I. p. 477.)

When, as in infiltrations, the cancer-structures are mingled with those of a natural part, the most frequent event is, that the growth of the cancer preponderates, and at length excludes that of the natural structures; so that, finally, the latter disappear, and a substitution (to use M. Lebert's term) of cancer, in the place of the natural tissues, is effected. But the reverse of this sometimes happens; instead of atrophy, hypertrophy ensues in the natural structures of the affected part; and within the same area both normal and abnormal structures grow excessively. Thus it is with the growths of bone that form skeletons of the medullary cancers, and with those of fibro-cellular and elastic tissues that extend into the exuberant epithelial cancers.

The cancerous substance may be found in a rudimental state, as an undeveloped blastema. Vogel, whom Virchow generally confirms,* describes it as a firm, compact, amorphous substance, like coagulated fibrine, which is rendered transparent by acetic acid, ammonia, and other caustic alkalies, and sometimes includes molecular granules, which consist of modified protein or fat.

The developed cancer-structures, if we except the few cases in which they are fibrous or osseous (pp. 321, 499), may be generally described as formed of nucleated cells, or of such corpuscles as are rudimental of, or degenerate from, the nucleated cell. Herein, and in the fact that the corpuscles are neither imbedded in formed intercellular substance, nor orderly arranged, lies one of the characters by which cancers are distinguished from other tumours, and from all natural parts. Their chief heterology, in respect of construction, is in this disorderly crowding of their elements; and I believe it is constant, unless when they imitate the plan of some adjacent natural gland-structure (pp. 369, 382).

We observe, in the large majority of cancers, two primary or foundation-forms of cells, of which the respective types may be found in gland-cells, and in epithelial or epidermal cells. Of the former, we have examples in the ordinary cells of scirrhous and medullary cancers (pp. 298,

* In his Archiv, B. i. p. 111.

370); of the latter, in the ordinary epithelial cancer-cells (p. 435); and it is, perhaps, very significant of the meaning of cancer, that the forms which its structures are most prone to assume are after the pattern of those belonging to the natural structures whose office is to separate whatever is refuse or abnormal from the blood.

I say, the cancer-cells are formed on the types of excretory gland-cells and epidermal-cells; yet, without deviating from the general type, they have special characters by which it is seldom difficult to distinguish them. The question is often asked, What are the characters of the true cancer-cell? or,—Has the microscope discovered any structure which is decisive of cancer, wherever it is found? The answers may be,—(1.) Where cells, such as are described at pp. 298 and 435, are found alone, or chiefly, composing a tumour, we may be certain that the tumour is a cancer: we may, therefore, regard these as especially cancer-cells. (2.) When a tumour is composed, chiefly or alone, of corpuscles, such as the nuclei described at p. 368, or any others which we can trace as rudiments or degenerations of the cancer-cells, the diagnosis of cancer is not less certain: structures such as these are found composing none but cancerous tumours. But if the question be changed to,—Are there any cancers which are not formed of structures such as these?—the answer must be affirmative: for there are rare tumours which present the whole clinical history of cancers, and which should therefore be called by the same name, though they have not these peculiar cancer-structures, or have them in very subordinate quantity. I do not refer here to cancers of which all the structures are imperfect, or degenerate, or diseased; but to such as the fibrous cancers (p. 321), the osteoid (p. 499), and certain varieties of the medullary (p. 369 to

372)* These all deviate from the assumed specific cancer-structures; and two of these, the fibrous and osteoid, approximate to the characters of natural tissues.

Together with the disorderly construction, and the peculiar cell-forms, we may often observe, as characteristic of cancers, the multiformity of the structures composing their mass. It is not equalled, I think, by any tumours, unless they be the cartilaginous or the mixed glandular and cartilaginous (pp. 174, 201). The variety of forms appears due, in part, to the mingling of the perfect structures with such as are in various stages of development and degeneration; and, in part, to what seems like a disorderly overgrowth and endogenous increase in cells and their contents. All these forms have been already described; but they may be thus enumerated and arranged:—(1.) The chief of those to be referred to incomplete development are the free nuclei, and abundant undeveloped liquid or other blastema (pp. 300, 367, 437). (2.) The chief forms due to the degeneration are the transitions from cancer-cells or nuclei to granule-masses (pp. 301, 436); the withering corpuscles with fatty degeneration found in the material like tubercle in cancers (pp. 301-3, 399); the calcareous deposits (p. 400); the abundant granular matter; and the occasionally mingled melanoid cells (p. 484). (3.) Overgrown or abnormally developed corpuscles are seen in the various extensions of

* Some pathologists would exclude from the name of cancer all these tumours, and all which are not composed of the "specific" cancer-structures; but I feel sure that we shall do right if (when a choice must be made) we choose modes of life, rather than structures, for determining the affinities of morbid products, and for arranging them under generic names. As of all tumours, so, especially, of cancers, the true nature is to be apprehended only by studying them as living things. (Compare p. 4.)

cell-walls into angles and processes (p. 299, 371, 436); and in the enlargement of free nuclei and their assumption of the characters of nucleated cells (p. 300, 368, 437). (4.) The endogenous increase in cells is exemplified in all that is described of the brood-cells and laminated corpuscles of the epithelial and colloid cancers (p. 438, 521).

It would be too tedious even to enumerate more forms than these of the component cancer-structures, and I need not again describe them. It is not their multiformity, so much as the existence of many of them in a single mass, that is generally characteristic of cancer.

Various as are these corpuscles of cancers, it is yet to be observed, that there is none so entirely different from those of normal structures, that we cannot point-out among them its type or parallel. No observation since Müller's time has invalidated his demonstration of this principle. The experienced microscopist will, indeed, very rarely fail in the diagnosis of a cancer by its minute structures; but he only discriminates them as specific modifications of the nucleus, nucleated cell, endogenous cells and other forms, of which the types are in natural parts; he finds among them no new type-forms.*

In like manner, the elemental cancer-structures show no method of growth or development which is without parallel in natural structures; they are formed and increased according to the same general laws as are observed in the normal rudimental structures; their peculiarities, in this regard, are chiefly in the seeming disorder that often prevails

* This is now sufficiently evident for all the simple cells and nuclei of cancer; and the more complex endogenous cells and developing nuclei find their parallels especially in cartilage, the preparatory structure of medulla, and the thyroid and similar glands. (See, especially, Rokitansky "Die Kropf," and "Ueber die Cyste;" and Virchow, in his Archiv, B. iii.)

among them,—in the absence of an apparent singleness of design.

The abundance of cell-structures in cancers has suggested that they are lowly organized, and many consequences have been hence deduced. The terms "high" and "low," in relation to structures, are derived from very arbitrary estimates, and are too fallacious for any important deduction in pathology; still, it may be observed, that among morbid products, cancers should stand high rather than low; for their elemental forms are on a level with those of natural excretory organs, and more developed than any but the best inflammatory lymph. If there were any correspondence, such as has been assumed, between lowness of organization and malignancy, the ordinary croupous or corpuscular lymph should be a much worse material than cancer; but malignant properties, like malignant spirits, are not confined to the vilest forms.

The proper structures of cancers are supported and held together by fibrous, membranous, or other connective tissue, forming their "stroma." This stroma, as I have elsewhere described, is formed, in the case of cancerous infiltrations, by the natural fibrous or other tissues of the infiltrated part, which, in different cases, are either gradually reduced in quantity or increased. In these cases the stroma is no proper cancer-structure, and varies with the nature of the affected part (pp. 305, 363, 425). But in distinct, isolable, cancerous tumours, a stroma is formed appropriate to the cancer, and, in many cases, with a definite mode of growth,—the dendritic mode (pp. 375, 511). Generally, however, it is only in its plan or construction that the stroma is peculiar; its tissues are simply membranous, or nucleated, or filamentous, or it may be osseous: they are not cancerous.* We see, therefore, in cancers

* Exceptions to this statement must be made for certain fibrous

thus formed, as well as in the cancerous infiltrations with overgrowth of the natural structures, the coincident growth of morbid and of normal tissues within the same area, and out of the same mixed materials.

With the stroma of cancers are their blood-vessels, among which we must again distinguish, as in the preceding paragraph, that some are the vessels of the affected part now involved in the cancerous infiltration, others are new formed. Concerning the changes which the first-named may undergo in the growth of the cancer, we have, I believe, at present, no knowledge. They are not, as in tuberculous infiltrations, gradually destroyed or removed; rather, they seem to be increased; so that an injected scirrhous cancer of the breast (for example) often appears more vascular than the adjacent substance of the mammary gland, though, in the first instance, it had only the blood-vessels of the part of the gland which it occupies. No direct observations, however, have shown the method of this increase.

The new-formed blood-vessels of the isolable cancers and the cancerous outgrowths extend from those of the adjacent parts. It is by some thought that they are formed as an isolated system of tubes in the cancer: I know no satisfactory evidence of this; and the associated theory of blood being formed in the substance of a cancer, and out of cancer-

and osteoid cancers, in which the fibrous and osseous tissue, if regarded as a stroma for the mingled cancer-cells, must be admitted as a proper cancer-structure; and for some cases of medullary cancer, in which a kind of stroma is described as formed of series of elongated cancer-cells.

It must be observed, also, that the line between infiltrations and isolable tumours is here, as elsewhere, somewhat artificially drawn. It is not to be denied that the latter may involve small portions of natural tissues, which may remain intersecting or partitioning their masses, and supplying a frame-work upon which their peculiar stroma may be constructed.

materials, seems to me wholly untenable. The method in which the new vessels extend into cancers has not yet been traced, but is probably not different from that observed in other new-formations (Vol. I. pp. 215, 366). Neither has anything specific in their structure or method of arrangement been yet observed. The descriptions already given of them (pp. 360 and 512) will show that the blood-vessels of cancers do not differ from those of other abnormal growths, except in that, generally, their calibre is more than proportionate to the thickness or complexity of structure of their walls. Hence the term "colossal capillaries;" and hence, when the blood-vessels are abundant, the likeness to the simple vascular erectile tumours: but in neither of these respects are the vessels of cancer without parallel in those of natural parts; those of the placenta and of the cavernous erectile tissue might be their types.

Such are the component structures of cancers. We might hope that chemistry, carrying its analysis far beyond the reach of sight, would find in them something as different from natural compositions, as their mode of life is from that of any natural member of the body. But it has failed to do this; and the numerous analyses made since those of Müller have not materially added to his results.* In a general comparison, the cancers are distinguished by the predominance or exclusive existence of albuminous compounds, while in the non-cancerous tumours gelatinous compounds (or in the adipose tumours, the fatty) are the chief constituents. But there are large exceptions on both sides. The fibrous and osteoid cancers yield abundant gelatine; the albuminous sarcomata of Müller (including, probably, many of the least-developed proliferous cystic tumours, and

* The best of these analyses may be found in Lebert's Traité pratique, p. 44, e. s.

the recurring fibroid tumours) are as albuminous as the typical cancers. It is probable, moreover, that the broad general difference between albuminous and gelatinous growths is not directly related to their respective properties, as malignant and innocent, but to their retaining or passing beyond the cell-form.

The want of a more definite result from chemical analysis is not to be ascribed to the absence of difference between cancerous and normal materials,—we may be nearly sure that they are chemically essentially distinct,—but, rather, to the fact, that an exact analysis of cancer-structures is nearly impossible. That which would be given to a chemist for examination is not a pure cancer-material, but a mixture of it with the materials of blood, blood-vessels, connective tissue, and, in many cases, of the natural or degenerate structures of the part in which the cancer has been growing. Add to this, that, in every sample, the cancer-structures themselves are, probably, in all stages of development and degeneration; and the search for the essential chemical properties of cancer will surely seem as difficult as it would be to find those of muscle, or of bone, in the analysis of the whole of a fœtal, or of a paralytic, limb.*

In studying the life of a cancerous growth, we have always to consider it as adding to the conditions of disease which already existed, and which usually still continue; it is a new factor in an already complex morbid process. The formation of cancerous material in the blood does not cease because some is incorporated in a growth; the transformations of parts, making them apt for the allocation of

* The case of the colloid material may seem not open to this objection; but the colloid is, probably, not a true cancer-substance, but the product of disease in cancer.

cancer, do not cease because one part is occupied. In al the history of cancers, therefore, we have to study the con tinuation of those processes which I described, in the last Lecture, as preceding the growth of the cancer, and which now (with rare exceptions) are concurrent with it, and in- crease with it.

Before the formation of a cancerous growth, we trace two distinct, though usually concurrent, processes: namely, that which leads to the cancerous condition of the blood, and that which makes certain parts fit to be seats of cancerous growths When once a growth is formed, it introduces a third element of disease, without necessarily removing or diminishing either of those that preceded it. As a living part, the cancer, like any other tumour, has the power of self-maintenance and of growth, which power, though favoured by the continued or increasing cancerous condition of the blood, is, probably, not dependent thereon. Also, in the results of its nutrition, the cancer reacts upon the blood, and through it influences the whole economy; and these influences are added to the cancerous diathesis or cachexia which is usually, at the same time and of itself, increasing.

The manifestations of life in a cancer may be divided (but it is too artificial a division to be followed far) into those which are progressive, and those which are retrogressive. The latter are traced in the various degenerations and diseases of its structures; the former in its growth, extension, and multiplication.

The chief characteristics of the growth of cancers are seen, in those that are infiltrated, in their invasion of all tissues, as if indifferently. Thus the scirrhous cancer of the breast, though limited for a time to the mammary gland, at length extends beyond it, and gradually occupies every surrounding part alike: thus the epithelial cancer extends from the integument of the lip to its muscles, glands, and all deeper tissues, and thence to the gum and jaw; and thus the medullary cancer grows into and through the walls of blood-vessels and other canals, and extends, among their contents, along their cavities. Such reckless growth (if it may be so called) is scarcely known except in cancers. They supply, also, the instances of most rapid increase; but although they do this frequently enough to make rapid growth one of the diagnostic signs of cancers, yet the cases are far from rare in which the growth is very slow. Few diseases are more variable than cancers are in this respect. (Compare p. 307, 394, 469, 181).

It has been assumed that the appearances of endogenous increase in certain cancer-cells are indicative of a peculiar inherent capacity of growth. But this is far from certain and is made improbable by the fact that the endogenous productions are most abundant in epithelial cancers, whose average rate of increase is least; and that those medullary cancers which have only free nuclei, or imperfect nucleated cells, are among those of most rapid growth. The rule is more nearly true, which these instances exemplify, that the rapidity of growth among cancers is inversely proportionate to the development of their elemental textures. But this finds exceptions in the very quickly increasing and multiplying fibrous and osteoid cancers.

Two things administer to the growth of a cancer; namely, (1) the continued formation of the specific material in the blood; and (2) the inherent power in the cancer, as a living part, to assimilate to itself the common or indifferent materials of the blood. The first of these maintains and augments, as it originated, the growth; the second effects an independent increase, like that of a non-cancerous tumour. The effect of the first is shown in the fact, that the rate of increase in cancers is, usually, proportionate to the indications of constitutional affection; the effect of the second is shown in the increase being accelerated by whatever augments the supply of blood to the seat of cancer (p. 331), and (if the facts be as I have stated them at p. 543) in the growth of cancers after inoculation.

In ordinary cases, both these conditions are engaged in the growth of cancer; but if the first fail, the second may suffice. The cancerous diathesis may cease, or be exhausted for a time, or sometimes even permanently; cancer material, we may suppose, is no longer formed in the blood; yet the cancer may subsist and increase by its own power. It does so like any other tumour; especially like those which I mentioned (p. 19) as beginning during or after some general disease, but continuing to grow when that disease has ceased.

Now, in this state, the cancer is essentially a local disease, living upon the materials of blood restored to health, though capable, probably, of infecting that blood, and inducing secondary phenomena of extension and multiplication. It illustrates, in this state, a principle which we are too apt to forget: namely, that diseases of constitutional origin may become wholly local. The origin of local diseases in constitutional conditions has been well studied, and the necessity of constitutional treatment, in chronic as well as in acute diseases, has been rightly referred to the local affections being maintained by the continued morbid condition of the blood; but it has been less considered that, after the constitutional disease has ceased, the local one may, of itself, continue, and need local treatment. Such cases are very frequent. One often sees syphilitic ulcers, which, doubtless, had a constitutional origin, and were maintained by specific material in the blood, and would have needed specific treatment of the blood for their cure; but now, while retaining their specific forms, they are curable by local treatment alone. Just so it may be, though very rarely, with cancers. While the cancerous diathesis is suspended, they may subsist by their own powers of assimilation; and I believe the few credible cases of recovery after operation are to be referred to the chances which have led to the occasional removal of such as were thus localized.

The extension of cancer (so far as it may be distinguished from their growth) is that which takes place through lymphatic vessels to their glands. The number of cases in which lymphatics, filled with cancer, have been traced from the primary growth to the nearest glands, is sufficient to make it probable that the disease often thus extends continuously from the one to the other; and that it is thus, as Mr. Simon expresses it, transferred by "continuity of blastema." But, even when such tracts of cancer cannot be traced from the primary disease to that in the lymphatic glands, I think Mr. Simon's suggestion is very probably true,—that the disease is one of the lymph, not of the parenchyma or vessels of the glands. We do not, indeed, yet know exactly the derivation of the lymph, nor what is its relation to the materials of the part from which it comes; but what we do know of it is consistent with the belief, that lymph, from a seat of specific disease, is likely to contain such of the materials of the disease as may either be carried to the blood, or may be organized in the lymph after the same plan as in their primary seat.

The characters of the secondary cancers thus formed in lymphatic glands are already described (p. 310, 385, 445, &c.); and these general principles may be gathered concerning them.

(1) The disease in the lymphatic glands usually repeats exactly that in the primary seat; the apparent differences between them depend only on the structures among which

the cancerous elements are placed. But this rule is n without exceptions (p. 312, &c., as cited above).

(2) The cancer in the glands seldom appears before th in the primary seat has made considerable progress. At general rough estimate, it appears about midway in th course of the disease towards death. The delay is, perhap not to be explained, seeing that lymph is carried fro the primary disease as well in its earlier as in its later stage

(3) While the disease in the glands makes progress, th primary disease usually keeps the lead which its earlier origi gives it. Occasionally, however, that in the glands so fa surpasses it that we are in danger of overlooking the pri mary disease (page 311, &c.) I do not know how the fac can be explained; but it has its parallel in the occurrence o primary cancer in the glands that are usually secondaril diseased, and in the recurrence of cancers after operation in the glands, rather than in or near its primary seat.

(4) The lymphatic glands usually become cancerous in direct succession from the primary disease to the thoracic duct. The extension is, generally, made slowly; in scirrhous and epithelial cancers the disease often remains long limited to the glands nearest to its primary seat; in nearly all cases, also, it is prone to increase in these proximate glands much more than in those more distant. Rarely, the secondary cancer appears in distant, rather than in proximate, glands; but in these cases it illustrates the multiplication, not the extension, of disease.

The multiplication or discontinuous increase of cancers may take place in the following ways:—

(1) The cancer-growth may multiply itself, from its pri- mary seat, to a part not directly continuous, but in contact, therewith. Thus Dr. Hodgkin and Dr. Budd relate cases of cancer in abdominal and pelvic viscera, with corresponding formations on the portion of parietal peritoneum or other

parts in contact with them; and thus there may be correspondence and contact of cancers on the two layers of pleura, or on the glans and prepuce.

(2) The multiplication may take place on a surface not in contact, but continuous, with the primary seat; as in cases by Mr. Simon (l. c.), in which cancerous growths were found scattered along the tract of mucous membrane leading from primary cancers in the kidney and lung.

In both these cases, the multiplication of the cancers seems to be the result of simple transference of the materials from the primary to the secondary seat of growth: it is effected by a kind of inoculation. The materials of a cancer, whether in formed germs or liquid blastema, pass from its mass, and develope themselves, and grow, where they rest.

(3) Cancers are multiplied in parts neither directly continuous, nor in contact, with the primary seat. In some instances the parts are near, in others remote from, the primary disease.

When cancers are thus multiplied near their primary seat by "irradiation," we find them, as it were, springing-up in an area which gradually widens, and of which the primary cancer is the centre. Thus it is with the tubercles in the skin and muscles near a scirrhous breast (p. 313); and with the secondary medullary, osteoid, and melanoid growths scattered round the main disease, but separated from it by intervals of healthy tissue (pp. 492, 497).

I do not know that we can explain this mode of increase of cancers otherwise than by reference to the seeming tendency of specific diseases to be allocated, not only in certain tissues or organs, but in certain places or regions (see p. 380). Certainly, peculiarities of tissue have little to do with this grouping of the cancers around the primary formation; for they may be found, promiscuously, in all the surrounding

tissues within a certain area. Neither does the c
lymphatic or other vessels seem to determine their p

In the increase of cancers by multiplications dista
the primary growth, there is scarcely an organ t
not be affected. We see this most easily in th
of melanoid cancers; yet their multiplicity is, proba
greater than that of other medullary cancers (see
The cancers that thus least frequently multiply are
thelial and colloid, and those, of whatever kind, in the
urinary organs, uterus, and brain. The organs in w
secondary cancers formed by multiplication are m
quently found are the lungs and liver; the latter, es
in cases of cancer of the abdominal viscera; the form
cially, in those of the breast, limbs, and other part
blood passes to the venæ cavæ. After the lungs a
the most frequent seats of such secondary cancer
believe, the pleura, bones, lymphatic glands, and
neous tissue; after these, no rule or proportion can b
except that many of the organs in which primary
are most frequent are very rarely the seat of se
cancer; *e. g.* the breast, uterus, testicle, and stoma

At present, probably, none but a very general exp
of this multiplication of cancers can be given:
scarcely venture to guess what determines the abo
tioned peculiarities. The general explanation may
multiplication to two sources, which are independent
concurrent and mutually influential; namely, the in
cancerous diathesis or morbid condition of the bl
the conveyance and transplantation of cancerous m
the circulating blood.

The constant increase of the morbid condition of t

* Lebert gives the best statistics on all these points (I

was shown, in the last Lecture, to be a general fact in the history of cancers. And, although it may sometimes be represented only by the accelerating growth of the primary tumour, yet we might well expect that it would often produce a numerical increase of cancers. The common indication of the most intensely constitutional cancerous disease is the simultaneous or rapid formation of numerous primary growths in different parts. This is sometimes witnessed at the very onset of the disease (pp. 384, 394); and it is, probably, also exemplified in the later periods of ordinary cases. Certain cases scarcely admit of explanation, on the supposition that the first-formed cancer is, in any sense, the source of all that grow after it: such, for example, as those in which a sudden rapid multiplication of cancers takes place (p. 395), and those in which they appear some long time after the removal of the first-formed growth.

The second method of remote multiplication of cancers, that of conveyance by the blood, is sometimes visibly demonstrated, and may almost always be assumed. I have spoken of cases (p. 536) in which cancers so grow into veins, that we cannot doubt fragments may be washed from them by the blood, and may grow wherever they come to rest; and I related one instance of osteoid cancer in which this almost certainly occurred (p. 506). But, even where no such intra-vascular growths appear, similar events may occur. In a case of primary cancer of the liver, in which the growths were all tinted with bright yellow by the bile, I found numerous small cancerous masses of the same colour infiltrated in the lungs; and the small branches of the pulmonary arteries leading to these were filled with bright yellow substance, as if they had been minutely injected with chromate of lead. The accidental colour of the cancer-materials, in this case, made their transference from

the liver to the lungs very evident; but the same
often, though less plainly, traceable.

The transference of cancer-materials, with the blo
a cancer already formed, need not be always seen t
lieved. Its frequent occurrence is made very prol
the many points of correspondence, which Dr. Wals
shown, between the dissemination of cancers, and
secondary abscesses after the entry of pus or other
rate inflammatory products into the veins. The
liability of the liver and the lungs to be the seats
these secondary diseases, and the evidence that they
organs in which foreign matters, introduced into t
lation, are most commonly arrested, may nearly p
they are, in all these cases alike, affected by
brought to them in the blood.

We need not assume that corpuscles of pus or c
any kind of germs already formed, must be thus c
the multiplication or dissemination of disease. A ru
liquid, an unformed cancerous blastema, ming
the blood, may be as effectual as any germs; a
almost necessarily be assumed, in the explanation
in which the dissemination takes place, not in the
liver, but in organs beyond them in the course of t
lation.

The materials conveyed with the blood from the
cancer must be such as are capable of develop
order to the multiplication of the disease. In the
absorptions occurring in the process of natural
and probably, also, in those that take place in the
of cancers, the venous blood carries away only d
or refuse materials, such as we may assume would

* Nature and Treatment of Cancer, p. 106.

pable of development I have mentioned cases (pp. 384, 402) in which masses of cancer, probably thus degenerate, were absorbed, without any appearance of consequent dissemination or other damage. We do not know what leads to the removal of such cancerous matter as can be developed; but the necessity of some change in the ordinary process of absorption is evident, and is the more worth studying because there are corresponding similar differences in the effects of the absorption of pus and other morbid products.

Such are the various means of numerical increase of cancers—by local inoculation of parts continuous, or in contact, with the primary disease; by extension, through a continuity of lymph or of blastema, to the lymphatic glands; by transportation of potent cancer-materials with the venous blood; by the cancerous condition of the blood becoming, of itself, more intense. In certain cases, the increase may be accomplished by all these means at once; the secondary cancers, also, as soon as formed, become like centres, from which a tertiary formation may be derived, as they were themselves derived from the primary; and to all this it may be added, that, with lapse of time and failing general health, all parts of the body are constantly becoming less resistant of disease, and more appropriate for the residence of morbid growths.

I have now to trace a general history of the retrogressive life of cancers; of that which, as I said (p. 572), is signified in their various degenerations and diseases.

The degenerations of cancer-structures are like those of natural parts, and of other products of disease. Examples may be cited of every form corresponding with those enumerated in the first volume (pp. 98, 373). (1) The withering, or wasting and drying, of the structures is exem-

plified in many scirrhous and epithelial cancers (pp
436); (2) the fatty degeneration is so common that i
be hard to find a cancer, in some of whose corpu
does not exist. The granule-masses ("the mulberry
of cancers are hence derived, as they are from man
morbid products. Hence, too, the "saponificat
cancers (p. 399); while to the fatty degeneratior
bined with more or less of withering, we may ascr
masses of substance, like tubercle, so often imbe
medullary cancers (p. 359), and the minuter sp
lines of soft ochre or yellow substance traversing s
and medullary cancers, like a "reticulum" (pp. 30
(3) A calcareous degeneration is observed in m
cancers, and in osteoid (pp. 400, 496, 501); an
bably, exists in many instances mingled with the f
generation. (4) Pigmental degeneration is proba
essential character of melanoid cancers (p. 489
Thickening of primary membrane is, perhaps, indi
some of the cancer-cells whose walls appear simp
nated (p. 439, fig. 60, D). A liquefactive degenerat
occur in some of the softenings of cancers; but, so
know, it ensues only in connection with disease. (C
Vol. I. 146, 413.)

In the interpretation of degeneracy in cancers,
again refer to the two conditions of their life; nam
maintenance of the morbid condition of the blood, a
inherent power of self-maintenance. The superve
another diathesis may lead to the degeneration or
a cancer (pp. 337, 402); but this is extremely r
transformation of diathesis may, I am disposed to
lead to the degeneration of one cancer while it prom
growth of one or more others; for there are cases
rent metastasis of cancer, in which the primary dis

withered, while secondary growths appear to have increased.* But these cases, again, are too rare to be reasoned from; and the usual course of events indicates that degeneration of cancer is, in the great majority of cases, an essentially local thing. For, commonly, part of a cancer, or one mass in a group, degenerates, while growth continues in the rest; and extensive degeneration is often found, in cases in which the rapid progress of the disease has testified to the full maintenance of the morbid blood. Hence the unhappy rarity of the recovery from cancer. One that is degenerate or absorbed may be as ineffective for harm as one that has been cut-away; but the constitutional element and progress of the disease are as little affected by the natural as by the surgical process of removal.

We cannot tell what are the local events that lead to this degeneration; but I suspect that the chief of them is the local obstruction of blood-vessels by growths of cancer into them.

The diseases of cancers, like the degenerations, are essentially local processes; they are most apt, indeed, to occur in the enfeebled general health, but they do not certainly indicate a decreased diathesis. It may suffice to refer, for examples of most of the diseases, to those already cited (pp. 332, 400, &c.); but two require more consideration; namely, softening and ulceration.

Some have believed that softening is almost a natural event in cancers, a change parallel with that in tuberculous deposits, and a necessary precedent of ulceration; while others, recoiling from the error of this belief, have written of the softening of cancers as a rare and unimportant accident. The truth is about midway between these extremes.

* Cases cited by Walshe, p. 110, 134.

There is no probability that (as some have supposed) tl hard scirrhous cancers ever become medullary by any proce of softening; a softened cancer is very different from a so one. There is no natural tendency in cancers to become so in their later stages: those of the oldest date commonl retain, if they do not increase, their original consistenc Neither is softening a necessary precursor of the ulceratio of cancers. But any scirrhous or other cancer may be sof ened by degeneration, or, more effectually and extensivel by inflammation of its substance. The fatty degeneration of which I have just been speaking are usually attended wit a softening; but the altered substance becomes drier an more greasy than before; it does not appear, in any degree liquefied (p. 302). That which is generally understoo as softening of cancer is, so far as I have seen, a more acut process, and the result of inflammation of its substance One may see it very well in the exposed protruding growth of medullary cancers (p. 400); or in those parts of them which lie just beneath inflamed portions of the integuments Sometimes, also, within scirrhous cancers that have rapidly enlarged, with heat and pain, and redness of the super-jacent skin, one finds large portions liquid, or else very soft, as it were rotten, shreddy, and infiltrated with pale, yellow, serous or puriform fluid. Sometimes such softening has distinct appearance of suppuration in the centre of the cancer; but these cases (which have suggested the terms cancerous suppuration or abscess) are, I think, most fre-quent in the secondary epithelial and medullary cancerous affections of lymphatic glands (pp. 403, 446).

If, as I believe, these softenings of cancer are the results of inflammation, they correspond with the softenings pro-duced by the same disease in natural parts (Vol. I. p. 400); they are the results of such defective nutrition as always ensues in the proper textures of an inflamed part; and when pus is diffused in the softened cancer-substance, the process may be compared with ordinary purulent infiltration, which is always attended with loss of consistence in the affected part. With this view the microscopic characters of the softened cancers agree.

Such softening as this, taking place within a cancer, generally leads to ulceration, and to the discharge of the liquefied and degenerate materials, with whatever of serum, or pus, or blood may have been mingled with them. This discharge is essentially similar to the opening of an abscess; but it is less regular, and the ulceration is quickly more destructive, and exposes widely the cancerous walls of the evacuated cavity.

I have already described both this and the other forms of ulceration that may ensue in cancers (p. 333, 396, 431). They are all, like the degenerations, essentially local processes, and not indicative of any peculiar advance or transformation of the cancerous diathesis. Ulceration is, indeed, a feature of the later progress of cancer, and it is most likely to occur in those whose health is most enfeebled; it is, therefore, often coincident with an exceeding intensity of constitutional disease; but it is not the consequence of such intensity. The amount of constitutional disease is indicated by the growth, or by the multiplication, of cancers rather than by anything which, like ulceration, implies imperfect maintenance of their structures; and so we commonly see one part of a cancer growing rapidly, while another is being destroyed by ulceration, or many growing while one is ulcerating. Now the growth is, generally, the measure of the force of the constitutional disease; the ulceration is the measure of the local defect of nutrition: and in these instances we may watch, at once, both the progressive and the retrogressive phenomena of the life of the cancer.

While dwelling on the constitutional origin of can-cerous growths, I must not forget their constitutional effec —the changes in the blood and other parts which are the consequences.

I said that a cancer adds a new element of disease to tho that were already in progress. And this may be said of in consideration both of its own life, and of the influenc which its growth and changes have upon the whole econom If we assume a constant process of nutrition in cancers, cannot but be that the blood will be affected both by wh they take from it, and by what it derives from them in th process of nutritive absorption. This latter source of chang of the blood has been too little considered,—the former, per-haps, too much; for the quantity of good nutrient materia abstracted from the blood, in the growth of a cancer, is pro-bably very trivial, whereas what returns to the blood is almost necessarily a morbid substance. It may be incapable of deve-lopment into cancer, but, unless it can be at once eliminated, it must injuriously affect the blood. What change it works we cannot tell; nor can we tell more of the later changes produced when complete cancerous material is absorbed into the blood, or when secondary cancers multiply in important organs, hindering their functions; or when ulceration ensues with pain, hæmorrhage, discharge, and hectic, and all the various signs of ruined health. When these things are added to the still increasing cancerous condition of the blood, and when all, with mutual influence, are in progress, they make a state so complex that analysis seems impossible, and so various that no single or general description can be true. The general result is what is commonly called the cancerous cachexia; but (as I have said before) it should be called the secondary cachexia, to distinguish it from the pri-mary, which may precede the formation of a cancerous growth, or,in its independent increase, may far exceed the probable consequences of the local disease (pp. 342, 405).

The constituents of the secondary cancerous cachexia, I say, are too numerous and complicated for analysis; still we must always recognise, in the later stages of the disease, the double source of the morbid phenomena; namely, the progressive constitutional disease, and the effects, direct or indirect, of the local disease. How nearly independent the former is of the latter is proved by the results of removing the local disease. The secondary cachexia and many of its components may be, for a time, decreased; pain and discharge, and all the local accidents of the disease, may cease: but the average lengthening of life is very trivial (pp. 346, 407, 473). The fact proves, not only that the progress of the peculiar constitutional part of the disease is nearly independent of the local part, but, also, that the constitutional part generally contributes most to the fatal issue. However, in this, as well as in the times and manners of dying, and the times of recurrence after removal of the first growths, the differences in the several forms of cancer are such as should not be put out of sight by a general or summary description: death is the common, and almost constant end of all, but its circumstances should be studied separately in each.

In conclusion, let me add a few words respecting the nosological relations of the several forms of cancer to one another and to other diseases.

Here, as everywhere in pathology, it is difficult to keep the just mean of classification; to avoid, on the one side, confusion; on the other, too rigid circumscription. The many features of resemblance in all the forms of cancer, and the large general history which may be truly written of them, might lead us to merge all minor distinctions, and speak as of a single and uniform disease; but it would easy to show that, if in this view we write of the gene symptoms, progress, and diagnosis of cancer, or of the h tory of cancers in any single organ, we write vaguely, a are obliged to omit many points of importance, for fear contradictions. If, on the other hand, we look at co trasts rather than likenesses, we might be induced to sep rate some forms, as the epithelial and colloid, from t name of cancer, and to believe that the remaining form have no affinity with any other disease.

I suspect that the errors of such extremes as these (in nosology, as well as in that of cancers) come from our attac ing too much meaning to the terms that imply specific di tinctions among diseases; from our proneness to think them as if they meant the same as they do in zoology. Now there is no real correspondence between the two sets terms. A specific name, in zoology, usually implies that a to whom it is given have origin from a common stock; cer tain characters fixed, and not changeable, beyond certai narrow limits, by variety of external circumstances; and circumscription, *i. e.* intervals of difference between them and other species, which intervals are not filled-up by va rieties or intermediate forms. Now in all pathology, there are, probably, no such species as these; and the terms im- plying the existence of genera, species, and varieties of dis- ease, mean only that the products of diseases may be arranged, and the diseases themselves considered, in larger and smaller groups, according to the number and import- ance of the characters which they have in common. Such terms do not mean that the borders of each group of diseases are naturally circumscribed; they allow that the borders of each are confused with those of every adjacent group.

With this meaning, I have adopted the terms used in the foregoing Lectures. The whole group of diseases included under the name (used like a generic name) of Cancer or Carcinoma are sufficiently distinguished by the concurrence in them of all the characters of malignant tumours enumerated in the first Lecture (p. 10—17). But this group is not circumscribed; its borders are everywhere overlapped by those of diseases to which other names are given: there are no one or two characters pathognomonic of cancer and found in it exclusively. The foregoing Lectures have repeatedly illustrated this, especially in the accounts of the recurring proliferous cysts (p. 76), the malignant fibrous tumours (p. 151), the recurring fibroid and fibro-nucleated (p. 155), certain cartilaginous tumours (pp. 188, 207), some of the myeloid (p. 221) and mammary glandular (p. 260), and the rodent ulcers (p. 452). At the same time, this want of definition in the assumed genus of Cancers has been exemplified, it will be observed, chiefly by rare and exceptional cases; all the general facts collected in the Lectures have illustrated the sufficiency of the concurrent signs of cancer for a ground of general classification (see p. 18).

Among the different forms of cancer, I have already said (p. 481) that there appear to be unequal degrees of difference, which may be expressed by speaking of three forms —namely, the scirrhous, medullary, and epithelial—as species, and of the remainder as varieties, of cancer. All that has just been said of the want of circumscription for the so-called genus will, I need hardly say, be applicable to these smaller groups. But here is the chief point, at which, while avoiding too much precision, we must also guard against indifference; for, as it has been wisely said, truth is more likely to emerge from error than from confusion. The species and varieties of cancer, as of other diseases, do not correspond with those of living creatures; yet the differences of the groups thus named are inconsistent with t theory of a single unchanging disease; and I believe t future study of the grounds of these differences will pro very fruitful both in knowledge and in practical utility.

As yet we can only speculate upon them in questio Do they imply so many essentially and originally differ morbid materials? or is there one material for canc one carcinogen, which, like an organic radical, may fo different yet closely allied compounds, in its combinati with the various substances provided by different bloods, different parts? Is not this hypothesis more appropri than the first for the less usual phenomena of transformati such as I have described as occurring in the progress, s cession, and hereditary transmission of the cancerous c stitution? Is it inconsistent with the gradual fusion of characters of typical cancer in those of other diseases?

LECTURE XVI.

TUBERCLE.

One often speaks of cancerous and other tubercles, meaning only small knots or knotted masses of the specified morbid growths; and of tubercular cutaneous eruptions, meaning small circumscribed flattened elevations or thickenings of the cutis. But when "tubercles," without any specific designation, are spoken of, the word is always understood to refer to little masses of a peculiar product of disease, the type of which is found in the lungs as the essential anatomical constituent of pulmonary consumption or phthisis. The same material as composes the pulmonary tubercles is found in many different forms and organs, and, wherever it occurs, is described as "tubercle," or "tuberculous matter;" and "tubercular disease," or "tuberculosis," is the usual designation of the specific diseases of which the essential feature is the production of this peculiar matter.

Tubercle or tuberculous matter may be formed in distinct isolable masses, round which the adjacent tissues are extended. These, which are most frequent in the brain and, I believe, in the subcutaneous tissue, may be like tumours, except in that they are not vascular, and, probably, have no inherent capacity of increase. But the most frequent formations of tuberculous matter are in infiltrations of the natural tissues, which infiltrations may be circumscribed, having definite, though generally irregular, outlin or diffuse, *i. e.* wide-spread and indefinite.*

In the lungs (to which, on account of its exceeding fr quency, we are bound to look for its type) tuberculo matter appears, as Rokitansky says, in two chief varieti or in forms combining, or intermediate between the These are generally distinguished as the "grey" and t "yellow" tubercles; or the grey tuberculous granulation and the crude tubercles. It may also appear as a diffu tuberculous infiltration, either alone, or, more frequentl associated with the preceding forms, or the changes co sequent on them.

The grey tubercles appear as masses about as large, o an average, as millet-seeds (whence their name of miliar tubercles), imbedded in the substance of the lungs. They are usually from a quarter of a line to a line in diameter; and when the lung is cut through, so that its elastic tissue can recoil and subside, they appear slightly raised on its cut surface, and the finger may feel them as little firm resisting bodies set in the lung. They look round or oval; but their borders are very irregular, with short outrunning processes. They are grey, semi-transparent, and moderately bright; or, sometimes, are very glistening, with a greenish grey "cat's-eye" tint. In the latter case, they may look like little vesicles; but they are always solid. They may be discrete, *i. e.* placed singly, and with distinct, though small, intervals in the lung, or collected in groups. They occupy and involve in their substance the tissues of the lung, and are so connected, that portions of these tissues

* The name, tuberculous infiltration, is commonly given to this diffuse form alone; but in the miliary and other tubercles, even in the lungs, the peculiar materials are equally infiltrated among the natural tissues; only, in these the infiltration occupies a defined area.

always adhere to them when we try to separate them. They may be easily broken or crushed, and, when thus treated, they yield but little fluid.

The yellow tubercles in the lungs have the same general forms and relations as the preceding, but are commonly larger and less firm, and are more often grouped so closely that, by fusion, they make-up nearly uniform tubercular masses half an inch or more in diameter. They are usually pale yellow, or yellowish-white, opaque, friable, dry, cheesy, smearing the surface on which they are crushed. Very often, their colour is varied with a smoky grey tint, partly due to intrinsic change, and partly derived from the pigment of the lung involved by them.

It has been generally considered that the two varieties of pulmonary tubercle here described represent two stages of the same disease; the grey substance being, after a time, changed into yellow. Rokitansky, however, holds that they are always different substances; and that, though they may be found, side by side, in the same lung, or may be mingled even in the same tubercle, yet the transformation of the grey into the yellow substance never takes place. His names of "simple fibrinous" applied to the grey tubercle, and "croupo-fibrinous" to the yellow, may imply that both the differences and the affinities between the two forms are comparable with those between the two chief varieties of inflammatory lymph (Vol. I. p. 332, &c.)

The minute structures of both the forms of tubercle are essentially similar; and their distinctive characters (in the state in which they appear to persist longest) are, the absence of blood-vessels (except of such as are involved in the deposit and not yet wasted), and the defectively developed or aborted state of the blastema and the corpuscles.

The blastema, or basis-substance, of a tubercle appears, usually, in fragments or flakes of a moderately firm, clear, or dimly molecular substance, swelling and made clear by acetic acid. It is most abundant in the grey tubercl most molecular or dotted in the yellow. It has no fil mentous appearance, no trace of developing nuclei (fibres.

The corpuscles held together by this substance, are (abundant minutest molecules, granules, and oil-particles various but usually small size; all these being extreme predominant in the yellow tubercle; (*b*) nuclei or cyt blasts, of various shapes and apparent structure, but a degenerate or defective; some glittering, hard-edge wrinkled, and withered; others granular; few or non with distinct nucleoli: (*c*) nucleated cells, similarly mis shapen, withered, or granular; (*d*) certain compound cel described on the next page.

Mingled with these, and varying according to the situa tion and circumstances of the tubercles, numerous other but accidental, substances are often found: namely (*a*), th involving and disintegrating structures of the lung; mem brane or elastic fibres, degenerate epithelial cells of the air vesicles or minute bronchi: (*b*) various and usually dege nerate products of inflammation from the adjacent parts granule-cells and -masses, pus-cells, &c.: (*c*) molecules o calcareous matter, or of pigment, and crystals, especially o cholestearine.

Such are the ordinary constituents of pulmonary tuber cle, and the shrivelled nuclei and imperfect cells, bein usually the most abundant and distinct, are called tubercle corpuscles. Similar materials are found composing th tuberculous matter in other parts. In the lungs, accordin to Virchow* and Schroeder van der Kolk,† their origin may

* Würzburg Verhandlungen, i. 81.

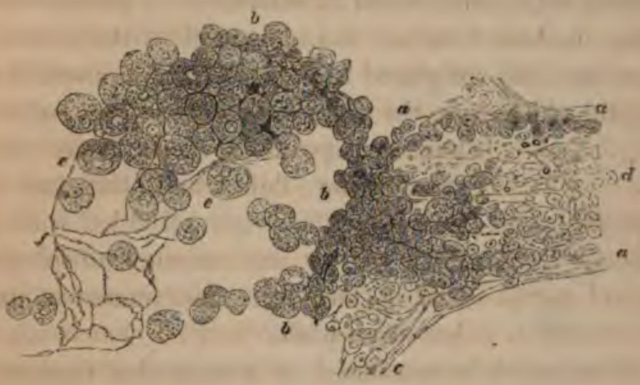
† Over den Oorsprong en de Vorming van Tubercula Pulmonum Nederlandsch Lancet, 1852.

n an earlier stage, be traced in changes of the epithelial cells of the air-vesicles.

The adjacent copies of the drawings by Schroeder van der Kolk may, with his description of them, suffice to explain the process.

" The margin of an air-vesicle, from which most of the

FIG. 72.*



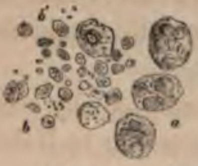
tubercle-cells are removed, is shown at *a a a*; that of another adjacent vesicle, nearly filled with tubercle-cells, at *b b b*; and that of a portion of a third vesicle, clear of tubercle-cells, at *c*. At *d* the still unaffected wall of the air-vesicle is shown covered with epithelial cells of various sizes, and containing nuclei, oil-drops, and granular matter. In the middle and at the end of the same vesicle are some cells of darker tint; they are no longer flat, but filled with some material, and thereby more or less swollen and spherical; they are epithelial cells more or less distended with

* Fig. 72. Very thin section of a portion of tuberculous lung, described in the text. Magnified 420 times.

fluid, and detached, and, as the series of them shows, th constantly enlarge. In the next vesicle, *b*, these cells ha become much larger, and are closely adherent. It is o servable that the largest cells commonly lie in the middle the cavity of the air-cell: the larger are mostly filled wi many nuclei; in the smaller there is but one."

"It is thus evident, that these cells, which fill the a vesicles and make-up the tubercles, are nothing else th epithelial cells, which swell by imbibition of plastic matt enlarge, and are detached from the wall of the air-vesic The cells which are placed in the middle of the vesicle a thus, the oldest, *i. e.* the first removed from the walls, t

FIG. 73.*



longest exposed to the influence of t surrounding fluid, and therefore t largest.† They are all filled with gr nular matter and minute oil-spherul and in the larger an increase of nucl has taken place."

"If tubercles be examined in a somewhat further ad vanced stage, when they show more tendency to softenin the larger cells just described are found in much le quantity, and in place of them the air-vesicle is fille with smaller cells [and nuclei]. Among these, howeve some larger cells appear (as in fig. 73, *a*), containing small cells or nuclei, which are completely like those that are fr (*b b*); so that there can be no doubt but that, in this stat the larger corpuscles are dissolved or burst, and the small

* Fig. 73. Tubercle-corpuscles: magnified 420 times and describe in the text. Copied from Schroeder van der Kolk.

† In the College-Museum, No. 297, is the lung of a Benturon (Arctictis Benturong), which shows, apparently very well, this pr gressive accumulation of tuberculous matter from the walls to th centres of the air-cells.

ones set free." These smaller cells and nuclei set free are what have been generally described as the tubercle-corpuscles; and, as I have already said, the tuberculous deposits, after the earliest periods of their formation, may appear to contain no other formed corpuscles besides them.

Now the most peculiar character of tuberculous matter which these descriptions illustrate, is its early degeneration, its abortiveness; it is shown as a material which, after proceeding for a little way in the acquirement of organic structure, then stops in its course, recedes, and degenerates. This is evident, at once, in the shrivelled or granular state of the set-free nuclei and cells; and the later changes are still further degenerative; all prove tuberculous matter to be not only very lowly developed, but generally incapable of development.*

These later changes may be again illustrated by the examples of pulmonary tubercles, and, according to Rokitansky, may, like the differences of the original deposits, be compared with the degenerations of the fibrinous and cor-

* An exception to this statement must be made, for certain cases, in which one part of what seems to be an uniform exudation is developed into, or towards, false membrane, and another part passes through the degenerative changes of tubercle. Such an event may be seen, according to Rokitansky (Vol. I. p. 409), in the tuberculous disease of the peritoneum and other serous membranes, and is due, he says, to a mixture of the tuberculous exudation and of that of ordinary inflammation. Schroeder van der Kolk represents (as in fig. 72, *b*) filaments of rudimental new-formed tissue, which, he says, are sometimes found among the cells of pulmonary tubercle. In tuberculous peritonitis, the portion of material developed into false membrane may become vascular, and may make a seeming, though not a real, exception to the rule of the non-vascularity of tuberculous matter.

puscular or croupous varieties of inflammatory lymp
(Vol. I. pp. 374, 378).

(*a*) The withering (obsolescence, or Verhornung of Rok
tansky) is the peculiar degeneration of the grey tubercle i
the lungs. It loses, herein, its lustre, becomes dry, dens
and hard, and shrivels into a shapeless, or indistincti
fibrous, little mass. The change is sometimes associate
with a calcareous degeneration of the tubercles, and ofte
with corresponding changes in the part of the lung in whic
they are imbedded, and which becomes dry, shrivelled, an
dark with pigment.

(*b*) The calcification, or calcareous degeneration, occur
in the yellow, and in the mixed, forms of tuberculou
matter. When achieved, it may be taken as an indication
like the withering of the grey form, that the tubercles ar
not longer subject to change; that they are, generally, ob
solete, and without influence on the tissues round them
It may occur both in recent yellow tubercles, and in such
as are already softened; it is exactly comparable with the
calcareous degeneration of inflammatory lymph and pus,
and is usually associated with withering and pigmental
degeneration of the surrounding substance of the lung.

(*c*) The softening or liquefaction of tuberculous matter
is, also, observed only in the yellow and mixed forms.
Though more studied in tubercle than in any other morbid
product, it is not peculiar to it, but is probably analogous
with many other liquefactive degenerations, and may be in
all points compared with that of inflammatory lymph
(Vol. I. p. 374). It constitutes the so-called tuberculous
suppuration, and precedes the formation of tuberculous
ulcers and cavities.

The process of softening usually commences at or near
the centre of the tuberculous mass; in the part of it which

we may believe, being most remote from blood, is least able to maintain itself in even such low development as it may have reached. The central softening is that which is spontaneous and normal in a tubercle: it may be regarded as a natural degeneration of the morbid substance; but any collection of tuberculous matter may also be softened, at its periphery, by the mingling of liquid products of inflammation in the adjacent tissues. The two processes of softening may appear similar, and may coincide, but they are essentially distinct: one is spontaneous, the other accidental; in the one the liquid material is the very substance of the tubercle, in the other it is derived from without.

In the proper softening of a tubercle one sees its central part become, first, soft, so that, when cut across, it looks cracked and crumbling, and may be pressed away from the surrounding firmer part, leaving a little central cavity. In further stage of the degeneration, it becomes liquid, like thin pus, with flakes or grumous particles in a pale yellowish turbid fluid; and as the change makes progress, the whole tuberculous mass may be reduced to the same liquid state.*

The liquefied tuberculous matter consists of the lowest of the corpuscular materials already enumerated (p. 594); but they float now in a liquid containing more abundant molecules and particles of oily and calcareous matter. The usual sequence of the liquefaction is the discharge of the liquid, by ulceration of the tissues enclosing it; but if the liquid be retained, it may undergo further changes, which may be compared with those of the retained contents of chronic abscesses (Vol. I. p. 394). The

* Such changes may be seen better, I think, in the tubercles in the spleen than in those in any other part: Mus. St. Bartholomew's, Ser. xxii. 2, 3.

chief are, that its fluid parts are gradually absorbed, a
its fatty and calcareous matters increase, till it becomes
dry, greasy, crumbling, or gradually hardening, morta
like concretion.

The discharge of a quantity of liquefied tuberculo
matter, by ulceration through an adjacent bronchus,
through the integuments of a subcutaneous tuberculo
lymphatic gland (for example), leaves a cavity, vomica,
abscess; when the discharge takes place from single sma
tubercles, such as form beneath the surface of the muco
membrane of the intestinal canal, an ulcer remains; an
these are, severally, sufficiently peculiar in their characte
to be known as the tuberculous cavity, and tuberculou
ulcer.

The ulceration effecting the discharge is usually the con
sequence of inflammation in the tissues over the tuberculou
matter, and resembles that for the discharge of commo
pus. By similar inflammatory ulceration of its boundarie
the tuberculous cavity or ulcer may be enlarged; but mor
generally, and more normally, its enlargement is due to th
formation and discharge of fresh tuberculous deposits adja
cent to it. This may be best seen in tuberculous ulcers o
the intestines; but the same process occurs at the cavitie
in such parts as the lungs and lymphatic glands. At th
borders and bases of the cavity or ulcer one may often find
small secondary tubercles, which, following the same cours
as the primary, liquefy, and are discharged into the cavity
or on the surface of the ulcer, which they thus increase by
adding their cavities to it. Other tubercles, again, may
succeed to these and pass through the same changes; and
when many cavities and ulcers are thus simultaneously en-
larging, they come into collision, and two or more are fused
into one of sometimes vast dimensions.

In these changes, the tissues involved in the tuberculous deposits (whether primary or later) soften, and are disintegrated and discharged with them. There is thus, always, a loss of substance in the affected part, coextensive with the tuberculous cavity. But, the bordering tissues, if not tuberculous, may be infiltrated with organizable inflammatory lymph, which, in its development, may form a tough boundary to the cavity or ulcer, and, if fresh tuberculous matter be not deposited in it, may lead to complete healing.

Before illustrating the foregoing general account of tuberculous matter, and of its principal changes, by some of the instances which are chiefly interesting in surgical pathology, it may be well to speak of some affections which have an apparent or real affinity with it.

Degenerative changes, similar to those which ensue in the lowly developed materials of tubercle, may produce a similar appearance in other materials;—especially, in those which consist of cells, or rudiments of cells. Thus, it is common to find, in medullary cancers, and more rarely in others, portions of yellow, half-dry, crumbling, and cheesy substance, so like tubercle that, with the naked eye, they can hardly be distinguished from it. The cancers in which they occur have been described as mixtures of cancerous and tuberculous matters; but the microscope finds that the tuberculoid, or, as M. Lebert calls it, the phymatoid, material in them consists of cancer-corpuscles, withered, with fatty and calcareous degeneration, and mingled with molecular and granular matter. By similar degeneration, material like tubercle may be found in cartilaginous, rudimental fibro-cellular, and probably other, tumours. In all these instances, the microscope may usually ensure a just diagnosis, and may prove that the tuberculous appearance is only due to a withering and a fatty degeneration of materials that

have nothing but their degeneration in common with tru
tuberculous matter.*

Greater difficulty of diagnosis exists when, through simila degeneration, inflammatory lymph assumes the appearanc of tuberculous matter. It does so, sometimes, in chroni inflammation, or, when acute inflammation has subsided, i lymphatic glands, in the testicle, and, I believe, in som other parts. So, too, if the pus of chronic abscesses or othe suppurations is not discharged, it may gradually dry; an as its corpuscles wither, with fatty and calcareous degene ration, it may assume an appearance very like that of tuber-culous matter. And, in all these cases, the resemblanc may extend equally to the microscopic characters; so tha there are, I believe, no signs by which degenerate lymph or pus may be, in all cases, distinguished from ordinary tuber-culous matter. When, as in the cases cited in the first volume (p. 379), the lymph-cells have been developed and elongated before their degeneration, they may be known from any corpuscles of tubercle; and the many-nucleated cells in tuberculous disease may be distinguished from the ordinary products of inflammation; but neither of these forms may exist, and then I believe that a distinction of degenerate lymph from tubercle may be impossible. Cer-tainly, it is often very difficult to say whether the yellow, dry, and cheesy material, found in chronic enlargements or suppurations of lymphatic glands, should be regarded as tuberculous matter, or as withered and degenerate lymph

* Virchow (Würzburg Abhandl. B. i. ii. iii.) had proposed to speak of the change, in all these cases, as a "tuberculous metamor-phosis," or "tuberculization," and was, of course, misunderstood as if he had implied that every material may become tuberculous matter. He suggests, now, that the change by which so many essentially different things may become "cheesy," should be called "the cheesy metamorphose."

or pus produced by inflammation. The same difficulty may exist in the similar affections of the testicles; but in these, more than in the case of the lymphatic glands, we may be extremely doubtful of any material being really tuberculous, if it be found in them alone, and not at the same time in other parts of the genital apparatus, or in the lungs. Similar difficulties may exist in the diagnosis between tubercle and some instances of chronic pneumonia.*

Thus, then, there are not a few cases in which materials like those of tubercles are found as results of diseases that are not tuberculous; *i. e.*, that are neither coincident with, nor according to the type of, tuberculous disease in the lungs. And the difficulty hence arising is increased by this; that both tuberculous products, and the varieties of degenerate and withered lymph and pus, are especially frequent among persons of the "scrofulous" or "strumous" constitution; so that the degenerate lymph and pus are often described as "scrofulous matter;" and "scrofula" and "tuberculous disease" are often regarded as the same disease.

It is, I fear, impossible to clear the confusion arising from the interchanging uses of these terms, or to define exactly the cases to which they should severally be applied; but where definition of terms is impossible, the next best thing is an understanding of their meaning according to general usage. "Scrofula" or "struma," then, is generally understood as a state of constitution distinguished, in some measure, by peculiarities of appearance even during health, but much more by peculiar liability to certain diseases, in-

* Virchow has written fully on this point; and a clear statement of his and others' opinions, respecting the different forms of pulmonary phthisis, is given by Dr. Jenner in the Br. and For. Med. Chir. Review, Jan. 1853.

cluding pulmonary phthisis. The chief of these "scrof lous" diseases are various swellings of lymphatic gland arising from causes which would be inadequate to produ them in ordinary healthy persons. The swellings are du sometimes, to mere enlargement as from an increase of nat ral structure; sometimes to chronic inflammation; some times to more acute inflammation, or abscess; sometim to tuberculous disease of the glands. But, besides these, is usual to reckon as "scrofulous" affections certain chron inflammations of joints; slowly progressive "carious" ulc rations of bones; chronic and frequent ulcers of the cornea ophthalmia attended with extreme intolerance of light, bu with little if any of the ordinary consequences of in flammation; frequent chronic abscesses; pustular cutaneou eruptions frequently appearing upon slight affection of th health, or local irritation; habitual swelling and catarrh o the mucous membrane of the nose; habitual swellings o the upper-lip.

Now these, and many more diseases of the like kinds, are amongst us, both in medical and in general language, called scrofulous, or strumous; but, though many of them are often coincident, yet it is very difficult to say what all have in common, so as to justify their common appellation. Certainly they are not all tuberculous diseases. Little more can be said of them than that, as contrasted with other diseases of the same forms and parts, the scrofulous diseases are usually distinguished by mildness and tenacity of symptoms: they arise from apparently trivial local causes, and produce, in proportion to their duration, slight effects: they are frequent, but not active. The general state on which they depend may be produced by defective food, with ill-ventilation, dampness, darkness, and other depressing influences: and this general state of constitution, whether natural or artificially generated, is fairly expressed by such terms as "delicacy of constitution," "general debility," "defective vital power," "irritability without strength." Such terms, however, do not explain the state that they express, for they all assume that there are, in human bodies, different degrees of vital power, independent of differences of material; which is at least not proved.

Such is the vagueness of "scrofula," and of the terms derived from it, as commonly used in this country. They include some diseases which are, and many which are not, distinguished by the production of tuberculous matter. It has been proposed, but I doubt whether it be practicable, to make "scrofulous" and "tuberculous" commensurate terms: as at present generally employed, the former has a much larger import than the latter. The relation between the two is, that the "scrofulous" constitution implies a peculiar liability to the tuberculous diseases; and that they often co-exist. Their differences are evident in that many instances of scrofula (in the ordinary meaning of the word) exist with intense and long-continued disease, but without tuberculous deposit; that as many instances of tuberculous disease may be found without any of the non-tuberculous affections of scrofula; that, as Mr. Simon has proved, while the diseases of "defective power" may be experimentally produced in animals by insufficient nutriment and other debilitating influences, the tuberculous diseases are hardly artificially producible; that nearly all other diseases may co-exist with the scrofulous, but some are nearly incompatible with the tuberculous.

Now, whether we disuse, or still use in its vagueness, the term scrofula, we may make a group of the "tuberculous" diseases, defined by the peculiar morbid product, of which I have described the chief characters. Only, at present, we must be content, I believe, to be sometimes in doubt whether the substance found in lymphatic glands, and commonly known as scrofulous matter, be truly tuberculous matter, or degenerate lymph or pus.

The LYMPHATIC GLANDS, among the parts specially studied in surgical pathology, hold the first place in liability to tuberculous disease. In children, they are, even more often than the lungs, primarily affected; in adults, they are next to the lungs in the order of frequency; and in all ages, whatever part becomes tuberculous, the lymphatic glands in relation with it are apt to be similarly affected.

The glands most often primarily tuberculous are the bronchial, mesenteric, cervical, and lumbar. Their state, previous to the tubercular formation, may seem healthy; or they may be simply enlarged; or signs of inflammation may precede and accompany the deposit. Rokitansky says that, in some cases, the tuberculous matter, as in the grey pulmonary tubercles, appears in small round masses of greyish substance. But its far more frequent appearance in the glands is, like the yellow, pulmonary tuberculous matter, in the form of roundish or irregular deposits of yellowish, opaque, half-dry, cheesy, crumbling substance. Such deposits are infiltrated among the proper textures of the glands. At first discrete, and contrasting strongly, both in substance and in colour, with the unaffected portions of the gland, they gradually increase, till they may completely displace the natural structure, with its blood-vessels, or leave only a thin outer layer of it enclosing the yellow mass which they form. By the increase of the tuberculous matter, as well as by the swelling of their proper textures, the glands are usually enlarged; they may acquire even an enormous volume, and, when whole series of them are affected, may construct great lobed and nodular swellings. In all cases, however, the several glands maintain a kind of independence; so that one may enlarge while others diminish, and one or more may inflame or suppurate, while, in others, the tuberculous matter remains stationary, or retrogrades.

The minute structures in tubercle of the lymphatic glands are essentially similar to those described from examples in the lungs: and Virchow* has found that, in the first stage of the process, there is an endogenous increase of nuclei within the elementary structures, similar to that which I have described after Schroeder van der Kolk. The same softening and liquefaction, also, as in the lungs, is prone to ensue in the lymphatic glands.

The softening is usually central, and thence extending may affect the whole morbid substance. The result of the change is not a homogeneous liquid; but, rather, a mixture of thin, turbid, yellowish-white liquid, and portions of soft curd-like, cheesy substance, like fragments of tubercle softened by imbibed fluid. To these are commonly added the liquid products of the inflammation of whatever remains of the gland-substance, or its capsule, and the surrounding parts. The mixture constitutes the tuberculous, or, as it is generally called, scrofulous pus, of which the chief characters, as distinguished from those of ordinary inflammatory pus, are, that it has an abundant thin, yellowish, and slightly turbid liquid, with white, curdy flakes that quickly subside when it is left at rest.

The liquefaction of the tuberculous matter in the glands usually leads to its discharge; and this is effected, in the case of the cervical and other similarly placed glands, by ulceration, which differs from that for the opening of common abscesses, chiefly, in being slower, and attended with less vivid and less concentrated inflammation. There

* Würzburg Verhandlungen, i. 84.

is, therefore, less disposition to *point :* the skin is, propo tionally, more widely undermined, more extensively thinne Thus gradually, by thinning and inflammation, deprived blood, the inflamed skin over the tuberculous gland who contents are liquefied, may perish, and form a dry parc ment-like slough, very slowly to be detached. Mo commonly, however, one or more small ulcerated apertur form in the skin, and let-out the fluid. If the undermine skin be freely cut, its loose edges are apt to ulcerate widely if it be only punctured and allowed to subside gradually, usually contracts and recovers its healthy state.

The cavity left by the discharge of the liquefied tube culous matter, and of the fluids mingled with it, may hea up like that of an ordinary abscess; but it does so slowly and often imperfectly, enclosing portions of tuberculou matter, which soften at some later, and often at some dis tant, period, and lead to a renewal of the process for dis charge. However, such retained portions of tubercle, o even the whole of what has been formed, and perhap liquefied, in a lymphatic gland, instead of being discharged may degenerate further, and be absorbed; or may withe and dry-up into a fatty and calcareous concretion. Suc chalky masses, even of large size, are frequently found i bronchial and mesenteric glands that have been seats o tuberculous disease in childhood; and similar material, bu usually in small fragments, is often discharged from healin tuberculous abscesses in the neck.

Whether by healing after discharge, or by calcificatio of the retained tuberculous matter, the recovery from th primary tuberculous disease of the lymphatic glands is ofte complete and permanent. The original substance of th gland may be wholly destroyed; or portions of it ma remain indurated and fixed closely to the scar or th calcareous concretion.

I am not aware that tubercle is ever seen, primarily, in lymphatic vessels; but it may be often traced in those of the intestines and mesentery that are in relation with tuberculous ulcers involving the muscular and subperitoneal tissues.

I am not aware that tubercular deposits have been proved to be the origin of the so-called scrofulous ulcers of the integument; but that they are so is highly probable, seeing that such ulcers sometimes supervene at the openings for discharge of liquefied tubercle from lymphatic glands, and that, in many characters, they remarkably resemble the tuberculous ulcers of the mucous membrane of the intestines.

The ulcers for which we may suspect a truly tuberculous origin are most frequent in the neck, at the sides of the face, at the upper part of the chest, and on the arms. They are sometimes preceded by the formation of one or more small oval masses of firm substance in the subcutaneous tissue: these, passing through the usual changes of suppurating tuberculous glands, discharge themselves; and the ulceration extends from the aperture of discharge. But, more often, the ulcers commence in patches of skin which, with the subcutaneous tissue, have appeared, for some days or weeks, inflamed, thickened, and slightly indurated. Central softening and liquefaction ensue in these; the cutis is gradually undermined, and then ulcerates, letting-out a small quantity of thin, flaky, and turbid fluid, like that of liquefied tubercle. The ulcers thus formed have generally destroyed the thickness of the cutis. They are of various shapes; most often elongated oval, but sometimes round, or sinuous; more rarely annular or crescentic; very rarely quite regular in shape. Their margins are usually (if they are not quickly extending) undermined, rounded, thickened

and unequal. The skin upon and around their ma
pale rose-pink ; or tends, according to the activity o
of the disease, towards florid redness, or a pale li
Their bases are unequal, often nodular, or tuberculat
with unequal or succulent granulations ; they yield
turbid, whey-like fluid, which may concrete in sca
sometimes irritates the parts on which it lies. Th
no proneness to extend much in depth : neither
extend widely, unless acute inflammation supervene
boundaries ; rather, their tendency is to remain long
ary, or partially healing ; or, while some are healin
may be progressive.

The scar formed in the healing of these ulcers is
resembling that of the healed tuberculous ulcers
mucous membrane of the intestines. It is formed
tough tissue, which remains long fixed to the s
structures, and of which the surface is generally
with vascular congestion, seen through the thin co
new cuticle. But, chiefly, the surfaces of such s
deeply seamed and wrinkled ; or have promine
ridges that tend towards their centres, or across th
The cutis that surrounds the ulcers is very much co
in the formation of the scars : and both in this res
the abundant tough tissue constructing them, th
be likened to the scars following burns.

Among the BONES, tuberculous disease affects
quently those of spongy cancellous tissue ; such as t
and carpal, the vertebræ, the phalanges, and the e
articular portions of larger bones, especially of the
tibia, humerus, and ulna. When it affects bones
arranged in a group or series, it is usually found in
them at once. Thus, several vertebræ, or several c
tarsal bones, are commonly at the same time tuber

yet not often so equally, but that one of them appears first and chiefly diseased; while, in those gradually more distant from it on either side, the tuberculous deposits are gradually less abundant. In like manner, the parts of bones that act together in a joint are, usually, at the same time tuberculous.

Rokitansky says that grey tuberculous matter may be found, about tuberculous suppurations in bone, in the form of granulations seated in the medullary membrane. The usual appearance is that of yellow, soft, cheesy deposits, or infiltrations of tubercle. The infiltration may be either circumscribed or diffuse: and, in these differences, generally corresponds with the similar varieties in the lungs; especially in that, usually, the circumscribed infiltrations take place with scarcely any signs of inflammatory disease, while the diffuse are preceded and accompanied by all the signs and effects of slowly progressive inflammation of the bone.

In the circumscribed infiltrations, the tuberculous matter usually forms round, or oval masses, which are imbedded in cavities in the interior of the bones. At these cavities, several of which may exist near together, the normal textures of the bone appear to be disintegrated or absorbed, just as those of the lung are during the infiltration of the tuberculous matter among them. When the liquefaction of the tubercle takes place, a similar imitation of the formation of cavities in the lungs is noticeable. The usual thin puriform fluid is produced, and is often mixed with little fragments of bone. The bony cavity including it commonly becomes lined by a thin, smooth, closely adherent membrane,—the product, apparently, of ordinary inflammation. Appearances are thus attained, especially in the bodies of vertebræ, like those of numerous small chronic abscesses in bones: and similar cavities may be found between the bone and periosteum, when the tuberculous matter has formed between them, or has included the surface of bone in its infiltration. The liquid contents of the ca may be discharged through narrow apertures in the of the bone, or other surrounding parts; but, common more diffuse inflammatory or tuberculous formation en destroying both the walls of the cavities and their bound

The diffuse infiltration of tuberculous matter in bone be the form assumed from the first, or it may superven the preceding.* The deposits observe no definite sh they fill the cancellous spaces in the bone, displacing medulla, and either leaving the osseous tissue entir softening and disintegrating it, so that small fragm or larger sequestra, appear mixed with the cruml tubercle. The abundant deposit of tubercle, and the ness of the vessels of the inflamed and softening b make the swelling in this form more considerable in the preceding; yet it is rarely, if ever, great. liquefaction is attended with larger and more destruc though slow, ulceration of the bone; and is followe discharge of the fluid, together with products of inf mation, through many apertures, or from a widely rated surface. The bone bounding such ulceration moreover, commonly inflamed, if not tuberculous; thus the ulceration may constantly make progress depth and width, imitating the types of tuberculous u ration already described, in that the destruction is of t fold character: due partly to secondary formations liquefactions of tubercle, and partly to continued border inflammation.

The changes produced by circumscribed tuberculous

* The two forms are illustrated in the College Museum, 854-5; and in that of St Bartholomew's in Series I. 37, 38, 39, 103, &c.

posits in bone are, comparatively, seldom seen; for the disease is of slow progress, and rarely leads to death, or amputation, before the more diffuse ulceration has supervened and destroyed its characteristic features. The diffuse disease is therefore that which has been most studied, and which has supplied most of the examples of "scrofulous caries," "Pott's disease of the spine," "Pædarthrocace," &c. It is this, also, which is chiefly attended with suppurations, or, perhaps, tuberculous deposits, in the neighbourhood of the diseased bone.

The tuberculous diseases of bone are, comparatively, rarely healed. Mr. Stanley has well shown that the completely curable cases of "scrofulous" disease in bone are those in which "the changes have not passed beyond those of simple inflammation:" *i. e.*, of such inflammation as commonly precedes the diffuse deposit of tubercle. When tubercle is deposited in bone, its usual course is, as in other parts, only degenerative: it may liquefy, or calcify: it is, probably, never organized or absorbed. Calcareous concretions, that had their origin in tuberculous matter, may be found imbedded in or upon bone, enclosed in indurated osseous or periosteal tissue; but they are, I believe, extremely rare. Healing of tuberculous cavities and ulcers in bone is less rare. No new bone may be formed; but the membrane lining a cavity may become thick and tough: its contents may become denser and dryer; and the bone for a short distance around it may be hardened and solidified; and all the morbid process may cease. Or, the surface of an ulcer may gradually heal; compact hard bone forming on it, and combining with the thickened and scarred periosteum and superjacent tissues. Or, lastly, though rarely after tuberculous disease, when two ulcerated surfaces of bone come into contact, they may unite and coalesce: as in the anchylosis which may ensue after tuberculous ulceration of the articular portions of bones, or between ve in some of the cases of tuberculous disease of the sp among the bones of the carpus or tarsus. In all th stances, it may be generally observed that, as inf tion of the bone preceded and bordered the tube deposits and ulcers, so, when healing ensues, th adjacent to the scar or cavity is hardened, pale ye white, less vascular than in health, and made heav more nearly solid by the thickening of its cancelli.

The instances of tuberculous disease which ha been described may suffice, I hope, for all that I c in view; namely, the illustration of the general chara the disease, and the principal facts on which to f opinion concerning its nature and affinities.

On first thought, there may seem little right to such a relation between tubercles and tumours, as plied by their inclusion in this volume: yet the of resemblance are not few or inconsiderable. Th tion, broadly stated, is, whether tuberculous diseas nearest likeness to inflammations, or to cancers.* very difficult one to answer, for there are apparent arguments on both sides. On the whole, I am c

* The observations of Virchow and Schroeder van der specting the formation of tuberculous matter in epithelial other natural tissue-elements, are not opposed to this mode the question. It may be said that there are many points blance between tuberculous diseases and the degenerations but it would be a very far, and, I think, a very injudicious, of our ideas of degenerations, to include the process for th tion of tubercles among them. The differences between the lous disease and all the natural processes of merely defective separate it widely from all degenerations properly so-call tuberculous material naturally degenerates; but its productio be reasonably called a process of degeneration in any normal

to think that the really tuberculous diseases are more, and in more significant things, like the cancerous than they are like any others. Therefore, I have spoken of them here, and have arranged the illustrations of them in a corresponding place in the College-Museum. But I will now state both sides of the question.

I. The likeness between the tuberculous diseases and the inflammations, with lymph products that are least capable of development, seems to be shown in these things :—

(1) The likeness between tubercle and such lymph-products is often too great for diagnosis : they have been, and are, often confounded : and the withered and degenerate nuclei and other particles of which tubercles are chiefly composed are, at least, as much like those of degenerate inflammatory lymph as they are like any other morbid products.

(2) Inflammation, indicated by all its signs, is a common precedent and attendant of tuberculous deposit. It evidently exists in nearly all cases of the acute, and in many of the chronic, tuberculous affections of the glands, lungs, and other parts; and inflammatory lymph capable of complete development is sometimes mingled with tuberculous matter.

(3) The degenerations of tuberculous matter are, in all essential points, parallel with those of inflammatory lymph : and so are the processes preceding and following the discharge of the liquefied product.

(4) The same constitutional peculiarities (so far as they can be observed) precede and attend the tuberculous diseases and the so-called scrofulous inflammations which are not productive of tuberculous deposits.

Whether, therefore, we consider the local or the constitutional parts of the process, there may seem no boundary-line, no mark indicating essential dissimilarity, between the tuberculous diseases and the inflammations producing lymp nearly incapable of development. The conclusion, ther fore, might be, that the local disease is a specific inflamma tion, dependent on a peculiar diathesis or constitution the blood, and to be studied according to its analogies wi gout, rheumatism, syphilis, and the constitutional affectio that are manifested by local inflammations.

On the other side, it may be said,—(1) that the likene between tubercle and degenerated lymph is only that int which a large number of both normal and morbid produc merge in similar degenerations; (2) that the coinciden of inflammation and tuberculous deposit is accidental an inconstant, and that the mingling of the developing product of the one, with the degenerating material of the other, prove their essential difference; (3) that the same methods degeneration, and of disposal of liquefied materials, whic are observed in tubercle and aplastic lymph, may be notice in other products,—for instance, in cancerous and othe growths with ill-developed structures; and (4) that th similarity of the constitutional states only justifies the ex- pression, that "scrofulous" persons are peculiarly liable t tuberculous, as well as to inactive inflammatory, diseases.

II. The chief grounds for regarding tubercle and cancer as diseases of the same order are the following :—

(1) Tubercles sometimes appear as distinct masses, like tumours, in the brain, and in other instances of so-called encysted tubercle. And the dissimilarity between these and tumours, in that they neither grow by inherent power, nor are vascular, is only because their elementary structures abort, and very early become degenerate; it is only the same dissimilarity as exists between a degenerate, and a growing, mass of cancer.

(2) The general characters of malignant tumours, as deduced from cancers (p. 10), are also observed in tubercu-

lous diseases: namely, the elementary tuberculous structures are heterologous; they are usually infiltrated, and, at length, exclude, and occupy the place of, the natural textures; they have a peculiar tendency to induce ulceration after softening; the walls of the ulcer are commonly occupied by tuberculous deposits like those which preceded it, and, while thus occupied, have no disposition to heal; the tuberculous deposits apparently multiply in all the same manners as the cancerous do (compare p. 575, e. s.); and, whether in their extension or in their multiplication, there is scarcely an organ or tissue which they may not affect, though, like cancers, the primary tuberculous diseases have their "seats of election," and different seats at different periods of life.

(3) The tuberculous diathesis, the constitutional state which precedes the formation of tubercle, is scarcely producible by any external agencies, except climate; but it is frequently hereditary: and in both these respects it resembles the cancerous, and differs from the merely debilitated state in which the aplastic inflammations occur.

(4) The cancerous and the tuberculous diathesis appear to be incompatible and mutually exclusive: the production of tubercles is extremely rare, but that of lowly organized inflammatory products is frequent, in cancerous patients. Such incompatibility implies that cancer and tubercle are equally, and in the same sense, constitutional diseases; very different, yet of the same order in pathology.

(5) The tuberculous diathesis, like the cancerous, regularly increases, and is attended with cachexia, which is often disproportionate to the local disease. It is true that tuberculous disease frequently ceases in a part, and allows its healing; yet, if we look to its enormous mortality as the index of its natural course, we must see in it a law of increase, like that exemplified with fewer exceptions in cancers.

And such a law is not usually exemplified in the specific inflammatory diseases; for they generally tend to subside with lapse of time.

If, now, I leave the reader to consider for himself the question that may thus be argued, I shall but fulfil a purpose kept in view in all the Lectures—the purpose, namely, of offering materials for thought upon subjects of which I have not knowledge. It will be within the same scope if I suggest a contemplation of the seeming opposition between the chief subjects of the first volume and of this.

In all the affections considered in the first, we may trace purpose and design for the maintenance or recovery of the body's health. The strengthening against resistance, the reaction after injury, the turbid activity of repair, the collection and removal of inflammatory products, the casting of sloughs, the discharge of morbid materials from the blood,—all these are examples of the manifold good designs of disease; and they evince such strength and width of adaptation to the emergencies of life, that we might think the body was designed never to succumb before the due time of its natural decay.

But in the diseases considered in this volume we trace no fulfilment of design for the well being of the body: they seem all purposeless or hurtful: and if our thoughts concerning purpose were bounded by this life, or were only lighted by the rays of an intellectual hope, we could not discover the signs of beneficence in violences against nature, or in early deaths, such as I have here described. But, in these seeming oppositions, faith can trace the Divine purposes, consistent and continuous, stretching far beyond the horizon of this life; and, among the certainties of the future, can see fulfilled the intention of the discipline of sufferings that only death might mitigate. And, if we cannot always tell what is designed, for themselves, in either the agony or the calm through which we see men pass from this world, and cannot guess why, for their own sakes, some are withdrawn in the very sunrise of their life, and others left to abide till night; yet, always, God's purpose, for our own good, may be clearly read in the warning, that untimely deaths should make us timely wise.

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London:
Wilson and Ogilvy,
Skinner Street.

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